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The official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

COMING EVENTS

Annual Mineral Show
State Mineral Society of Texas
April 17-18, 1948
Driskill Hotel, Austin, Texas
(J.J. Brown, Pres., 302 Walton Bldg., Austin 11, Texas)

11th Annual Gem & Mineral Exhibit
May 1-2, 1948
Masonic Temple, 471 W. 41st Pl., Los Angeles, Calif.
Exhibit will be held by the Southwest Mineralogists, Inc. Everyone invited, Admission free.
(Walter S. Shirey, Show Chairman, 625½ W. 85th St., Los Angeles 44, Calif.)

1st National Convention
American Federation of Mineralogical Societies
June 13-16, 1948
Denver, Colo.
(Richard M. Pearl, Convention Chairman, Colorado College, Colorado Springs, Colo.)

9th Annual Convention
California Federation of Mineralogical Societies
July 16-18, 1948
Municipal Auditorium
Long Beach, Calif.
(Convention Chairman, 1850 E. Pacific Coast Highway, Long Beach 6, Calif.)

International Geological Congress
18th Session—Great Britain, 1948
Aug. 25-Sept. 1, 1948
(A. J. Butler, Gen. Sec., Geological Survey and Museum, Exhibition Road, London, S. W. 7, England)

Some 1,100 geologists from countries overseas plus British geologists will swell the attendance to over 2,000. Twenty-eight Governments and about 160 universities and scientific institutions will be represented at this, the world's greatest geological congress which meets every two years and each time in a different country. Field trips to many geological and mineralogical localities are on the program.

Northwest Federation Convention
Sept. 4-5, 1948
Bozeman, Mont.
(H. E. Murdock, Vice-President, Bozeman, Mont.)

THE TEXAS CONVENTION
April 17-18, 1948

The first big convention of 1948 (brought to our attention) is the Annual Mineral Show of the State Mineral Society of Texas. It will be held on April 17-18, at the Driskill Hotel in Austin, Texas. J. J. Brown, President of the Society, is in charge of the program and his letter of Feb. 1st extends such a cordial invitation to us to attend the big event that we hardly know what to say in reply —we haven't answered him yet. There are so many inducements offered in the letter—except to make us Governor of Texas (we couldn't accept this office, anyhow, as we understand the State is so large it would take ALL of our time to run it—then what would happen to *Rocks and Minerals?* If the magazine is late just one week now in making its appearance, the complaints are many, loud and fierce. But if the magazine should not show up at all—WOW! !).

Texas is a big state and so are its people and when they put on a show they do it in a big way. Rockhounds, all over the Nation, you are cordially invited to attend the coming show. There is lots of room for you in Texas—shonld you desire to remain a few days longer then the festi-

(Continued on page 229)

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THE SKULL VALLEY AREA, UTAH

By RONALD L. IVES

Vice-President, Rocks and Minerals Association

ABSTRACT

Topography, geology, and mineralogy of the Skull Valley area, Tooele County, Utah, are here described; physiographic history is briefly outlined; and land forms resulting from late Pleistocene inundation are discussed.

INTRODUCTION

Although known as a barrier to transcontinental travel since about 1830, the Skull Valley area, in central Tooele County, Utah, was not studied or mapped in any detail until about 1880, when G. K. Gilbert, one of the outstanding geologists of his time, visited the region in connection with his study of Lake Bonneville.

Unfortunately, during Gilbert's study, William H. Jackson, the official photographer of the U. S. Geological Survey of the Territories (now the U. S. Geological Survey), was busy elsewhere, so that no photographs accompany Gilbert's report. As the area, until recently, was practically inaccessible, and was visited only by local ranchers, many of the photographs included in this short paper are the first ever taken of the area.

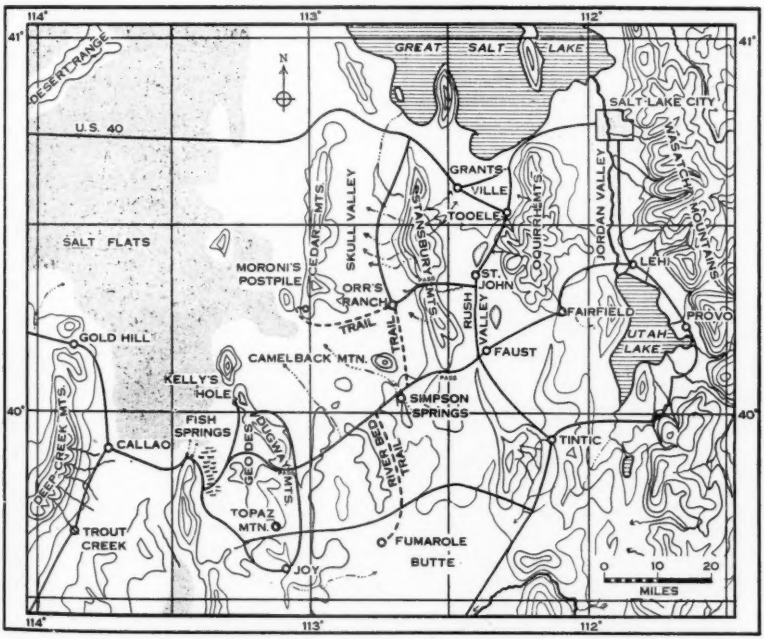


Fig. 1 Outline map of part of the Utah Desert area, showing location of Skull Valley (upper center) in relation to other features. Lowest contour is 5,000 feet; contour interval is about 1,000 feet. Make local inquiry before using roads shown on this map.

LOCATION AND ACCESSIBILITY

Skull Valley lies between the Stansbury and the Cedar Mountains in central Tooele County, Utah, and has a north-south extent of about 50 miles. General location is shown in Fig. 1.

The area may be reached from Salt Lake City via Grantsville by U. S. Highway 40-50, the turnoff for the Skull Valley road being at Timpie siding. Access is also possible via Tooele and St. John by the Johnson Pass road (bad in winter). Do not go west of the Orr's Ranch road on this route unless you have written permission to enter local military reservations.

Uulike many interesting areas in Utah, Skull Valley can be reached at all seasons in an ordinary automobile without serious difficulty. Best supply points are Tooele and Grantsville.

GEOLOGIC ENVIRONMENT

Skull Valley is a topographic low between the Cedar and Stansbury Mountains,both fault-block ranges composed largely of Paleozoic limestones, but containing igneous intrusions of various more recent ages. Latest igneous activity in the general area was in the Pleistocene.

A general view of the area, showing the salt flats in the bottom of Skull Valley, and the surrounding mountain ranges comprises Fig. 2.

Due west of Orr's Ranch (Fig. 1) the limestones and dolomites of the Cedar Mountains are replaced by a volcanic complex of mid-Tertiary age; and southwest of the ranch by a "cut in" of granite, which extends southward for several miles.

These geologic changes can all be attributed to displacements along a fault zone extending northeastward from Trout Creek (Fig. 1), through Fish Springs, Kelly's Hole, Orr's Ranch, Johnson Pass and Tooele to the vicinity of Bingham. Faults occur in each named location; all have the same trend; all are, or could be, of the same age. There are just enough gaps in the evidence, however, to make this attribution slightly uncertain.

Fig. 2 Aerial view of the northern part of Skull Valley, showing the Cedar Mountains (foreground), the salt flats of Skull Valley (white, middle distance), the Stansbury Mountains, and (on horizon) the Oquirrh Mountains. The plane was at about 20,000 feet MSL and the camera was pointed ESE when this picture was taken.

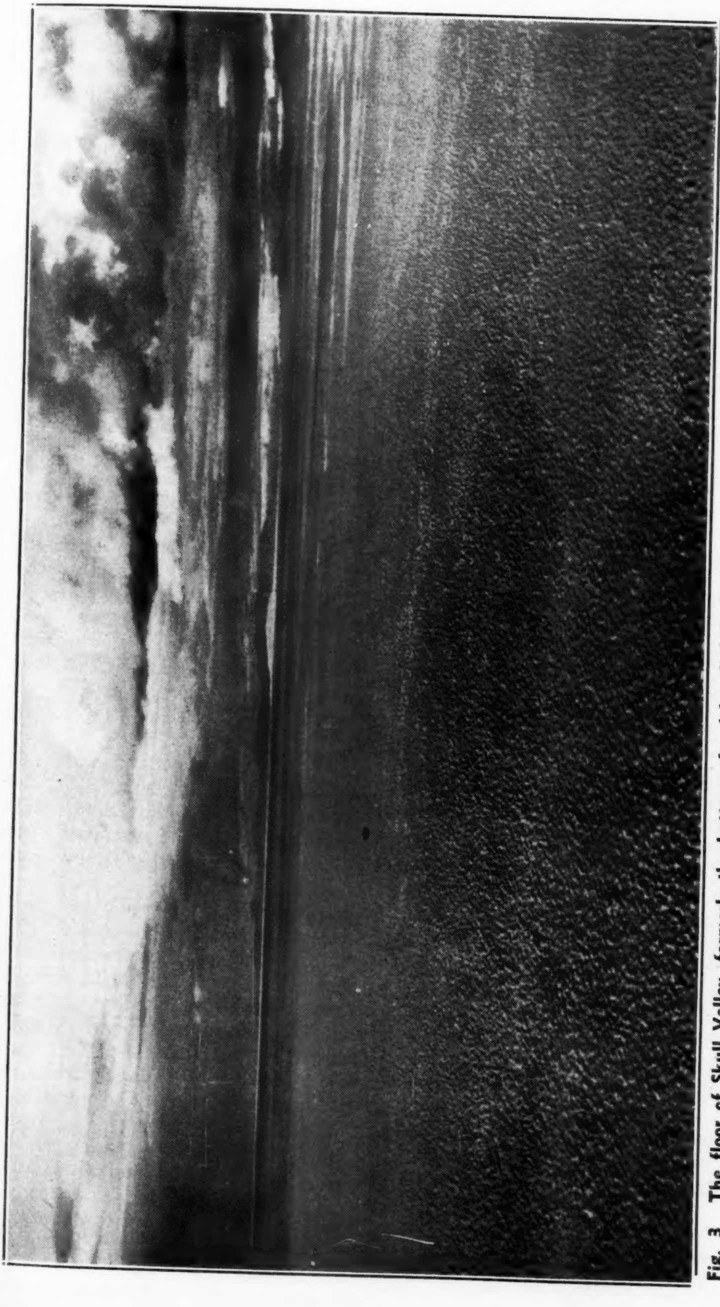


Fig. 3 The floor of Skull Valley, formerly the bottom of a lake slightly larger than the present Great Salt Lake. This view was taken from the summit of Pilot Rock (Fig. 4) looking north. Sage hummocks on the valley floor are typical of an area having no pronounced wind trend. Where such a trend is present, the valley floors are interrupted by a series of sage-topped ripples, perpendicular to the dominant wind direction.

Occupying the valley floor, in addition to the salt beds (Fig. 2) are extensive lake bed deposits (Fig. 3) of later Pleistocene age, ancient delta beds, and a few gravel bars. A sketch map of the valley floor, in the northern part, showing the location of the salt flats, and their relation to the present water line of Great Salt Lake, comprises Fig. 4.

MINERALS OF THE AREA

A wide variety of medium-grade mineral specimens can be found in this area. Although few minerals are plentiful, careful hunting will produce an interesting collection.

In the granite area, at the south end of the Cedar Mountains, large orthoclase crystals are occasionally found, as well as small black and dark brown hornblendes, and occasionally very small perfect black tourmalines. A few small beryls were found a few years ago in a road excavation, but these apparently are not plentiful.

Due west of Orr's Ranch, on the White Rocks trail, which leads to Moroni's Postpile, black obsidian is plentiful, as well as volcanic breccia, from which small volcanic bombs weather out. Small topaz crystals have been reported from this area, although none were found by the writer. From the descriptions, it appears that they have weathered out of the breccia.

At the contact of the volcanic area with the limestone and dolomite which composes the northern part of the Cedar Mountains, and near the contact of various intrusions with the country rock, various calcite crystals can be found. Dogtooth Spar is the most common form, but a few poor crystals of Iceland Spar, badly strained internally, have been found. These are probably contact metamorphic formations.

In various prospect holes in the Stansbury Mountains, especially near Johnson Pass, various sulphide minerals, such as galena, pyrite, chalcopyrite and occasionally cuprite, are present. Accompanying them are complex lead oxides; red, yellow and brown iron oxides; quartz and calcite. Sphalerite is uncommon here, although a few resinous masses have been found.

The northern end of the Stansbury Mountains is somewhat more metamorphosed than the southern end, and here magnesian limestone is quarried commercially (near Grantsville).

The salt flats produce very low grade commercial salt—"ice cream salt"—containing sodium carbonate and calcium carbonate as impurities. These appear to be the products of "base exchange"—a process by which soluble salts are gradually withdrawn from mineral solutions.

Large gravel deposits exist in the area, and are sporadically worked for road ballast. Small deposits of impure diatomaceous earth ("white marl") are found in Skull Valley, but are not at present commercially workable.

FOSSILS

Fossils of several ages are relatively plentiful in this area, but they cannot be collected with a scoop shovel. In the limestone areas of both the Stansbury and Cedar Mountain ranges, trilobites, of paleozoic age, are common. Good specimens, however, are rare, because of metamorphism. It was in this area that *Orria Elegans,* named for Daniel T. Orr, who still operates Orr's Ranch, was discovered in the 1890's.

Fossil corals and sponges, also somewhat distorted by metamorphism, are common in both boundary ranges. Occasionally, a very fine specimen, preserved, rather than damaged, by metamorphism, is found.

On the lower valley walls and floor, particularly in and near the tufa deposits associated with the lake shores and benches, very perfect gastropod shells, difficultly distinguishable from modern snails, are found. These shells are extremely fragile, although many of them are perfect when found. Similar gastropods are common in the small deposits of diatomaceous earth.

Two types of tufa deposits can be found. Algal tufas, deposited in conjunction with various water weed growths, are indicative of fresh or brackish lake conditions. Similar tufas are being deposited today in fresh-water areas. Base exchange tufas, the result of rather com-

plex chemical interactions, are indicative of very salty to saturated conditions. These are being deposited today in the salt flats of Skull Valley.

The shorelines at higher levels in Skull Valley, and throughout the ancient Bonneville Basin, are, in general, plated with algal tufas, while those at low levels are covered with base—exchange tufas.

LAKE FEATURES

Skull Valley, in common with all other low areas in the Bonneville Basin, was formerly an arm of Pleistocene Lake Bonneville, which had a maximum depth

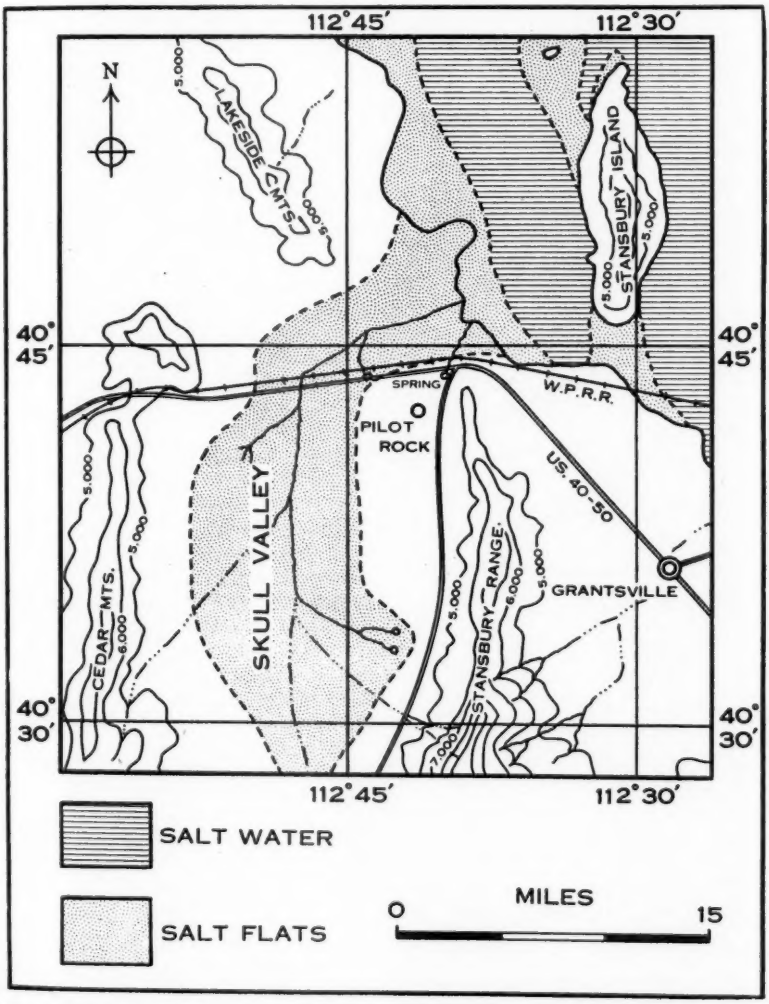


Fig. 4 Sketch map of the northern part of Skull Valley, showing relation of salt flats to other features. Should the level of Great Salt Lake increase by only a few feet, all of the salt flats here shown would be submerged. This map is based on a highway survey, and is not in complete agreement with Fig. 1.

Fig. 5 The Provo shoreline, on the east wall of Skull Valley, as seen from the summit of Pilot Rock. The weaker shoreline below it is the Stansbury.

slightly exceeding 1,000 feet. The highest shoreline—the Bonneville, is plainly visible on the walls of the valley.

The most prominent shoreline, in most places, is the Provo, which is about 375 feet below the Bonneville. This, heavily plated with tufa, represents a lower stage of the ancient lake. A typical view of the Provo shoreline constitutes Fig. 5. About midway between the Provo shoreline and the present valley floor is the Stansbury shoreline, which is multiple in most places and probably represents two lake stages, widely separated in time.

About 100 feet above the present lake level is the Dugway shoreline, representing a relatively recent high level of the lake. This is dated, by associated artifacts, as not more, and probably less, than 4,000 years old.

One of the prominent lake features of this area is Pilot Rock, a marine stack, now "high and dry" in the center of the valley. This (Fig. 6) was originally a limestone ridge, which was sculptured to its present form by wave action during former higher levels of the lake.

DESERT LAND FORMS

Unlike heavily-vegetated areas in less arid regions, the mountains bordering Skull Valley are exposed to immediate and severe erosion when it rains. In consequence, although the rainfall in this area seldom exceeds ten inches annually, erosion here is about as rapid as anywhere in North America (1" in 400 years, according to present estimates).

This combination of aridity and rapid erosion leads to a gully-fan-playa type of erosion cycle, rather characteristic of Great Basin deserts. A typical valley mouth is shown in Fig. 7. Here, material eroded from a gully in the west flank of the Stansbury Mountains is deposited on a large alluvial fan farther down the same slope. This is in marked contrast to the erosion—deposition relation in areas having integrated drainage, where, for example, materials eroded from a gully at Twogotee Pass, Wyo., are deposited more than 1200 miles away near the mouth of the Mississippi.

At various locations in the valley, low

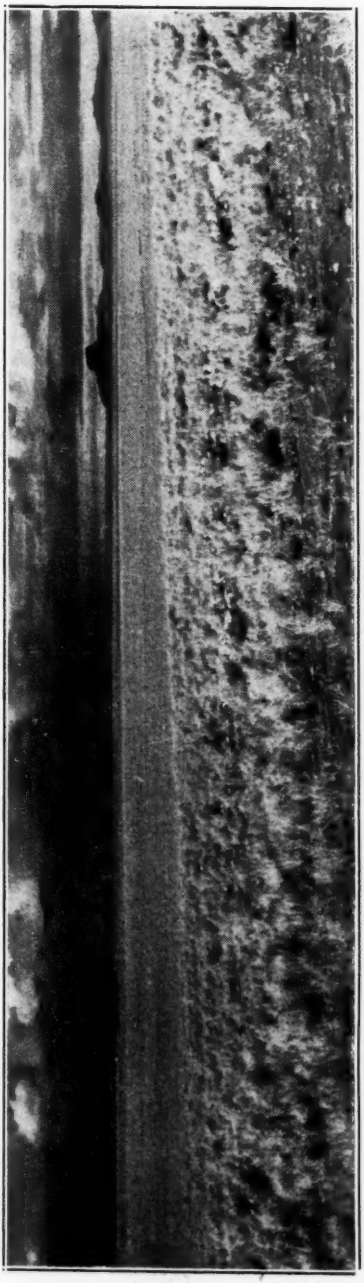


Fig. 6 Pilot Rock, a marine stack, shaped by the waters of an ancient high level of Lake Bonneville. The shoulder on the rock is about 100 feet above present lake level, and represents the Dugway lake stage of approximately 2,000 B.C. (estimated). The summit was planed off by wave action prior to that time. Land surface in the immediate foreground is part of a large alluvial fan, of relatively recent age.

ridges of boulders and gravel, roughly paralleling the valley walls, occupy parts of the valley floor. These are sheetflood "windrows", deposited during torrential localized downpours.

WATER SUPPLY

The most important mineral of the Skull Valley area, from an economic viewpoint, is water, which makes possible the grazing industry in the region. A number of perennial springs are present in the area. The best known is the Timpie spring, about 500 feet south of U. S. 40 at the end of the Stansbury Mountains on the west side. This is a fissure spring, slightly warm, but potable and dependable.

There are several seepage springs farther up the valley, most of them being saline. Good drinking water is also found in several of the stream channels leading down into the valley from the Stansbury Mountains. These are snow-fed streams, the flow of which in most instances disappears under the lake deposits at the Bonneville shoreline.

At the head of Skull Valley is Orr's Ranch spring, a large outflow of fresh cool water which has never failed (since found in about 1850). This, improved in the 1880's by a dam and the planting of trees, was an alternate stop on the Pony Express route; a regular stop on the stagecoach road; a way station on the old Lincoln Highway; and today is a scheduled campsite for the annual sheep drives across the area. This spring (Fig. 8) has its source in a large buried gravel bed, which serves as a reservoir, which receives a part of its annual recharge from local precipitation and a part from meltwaters on the Stansbury Range.

FIELD ETIQUETTE

The Skull Valley area is grazing country, administered under the Taylor Grazing Act. Roads and trails are maintained by the Grazing Service, in cooperation with the county and the local ranchers. By custom, anyone uses any road they wish, camps at any convenient water hole, and little attention is paid to strict interpretation of tresspass laws. However, as the livelihood of the local residents depends upon the range, exceptional care must be taken to prevent range fires, cattle gates must be left in the same position as found, and camps must be left clean. Because of isolation, it is customary for

Fig. 7 Desert Erosion and deposition. Because of scanty rainfall, lack of vegetative cover, and unintegrated drainage, materials eroded from the higher slopes are deposited on the lower. In this view, the source of the sediments is the gully in the background. Material removed to make the gully is deposited in the large fan in the middle distance. Note the merging of two fans here, the secondary gullying of the fans, and the relation of erosion area to that of deposition.

Fig. 8 The pond at Orr's Ranch spring. This unfailing water supply has made possible an extensive grazing industry in Skull Valley, and has determined the routing of the earlier roads and trails in the area.

all comers to give any possible aid to anyone having trouble.

The local Indians, who have a reservation in the center of the valley, are completely civilized, are steadily employed at skilled and semi-skilled work, speak good English, and are, in general, useful citizens. When dealing with them, straight questions get straight answers, and courtesy is repaid with courtesy.

REFERENCES

As it is impossible, in a paper of this length, to include all the pertinent background material, the following references containing it are cited:

Gilbert, G. K., *Lake Bonneville*, U. S. Geol. Survey Monograph No. 1, 1890.

Antevs, Ernst, *Correlation of Wisconsin Glacial Maxima*, Amer. Jour. Sci. Vol. 243-A, 1945, 1-39.

Worcester, P. G., *Textbook of Geomorphology*, New York, 1939, 220-263; 372-408; 519-528.

Davis, W. M., *Sheetfloods and Streamfloods*, Bull. Geol. Soc. Amer. Vol. 49, 1938, 1337-1416.

Dugway Proving Ground
Tôoele, Utah
Feb. 22, 1946

AN OCCURRENCE OF PSILOMELANE, VARIETY LITHIOPHORITE, IN FALLS CHURCH, VA.

By PHILIP R. COSMINSKY

Falls Church, Va.

The best mineral specimens are not always found on field trips. I found this out recently in an unusual way. A good many new homes are being built in my neighborhood, southwest Falls Church, and for the past several months I have been exploring the clay and weathered schist and granite, etc., as it was dug out of excavations for cellars.

For a long time nothing of interest turned up, with the exception of the masses of quartz that are abundant in this area. Some of the diggings did show fine examples of decomposed rock in place. One ditch in particular showed a dike that looked exactly like the granite and diorite that is quarried about a half mile north of here. When it was moved it crumbled to a mass of clay and silt.

Late one afternoon in the early winter I explored a new digging, close to a spot where I had found casts of very large pyrite crystals in a mass of quartz rock, as well as several small limonite pseudos after pyrite. Just before dark I found several pieces of a black substance that I was unable to identify until I had carried it home and scrubbed the clay from it.

It appeared to be botryoidal psilomelane. As I had never heard of this form of manganese oxide being reported from this area, I went back the following Sunday afternoon and managed to dig up a water bucket full. Most of the pieces were small, but all showed the botryoidal formation. I took several pieces down to Mr. James H. Benn at the U. S. National Museum, Washington, D. C., and he tentatively identified it as psilomelane, variety lithiophorite. He compared my specimens with several others of lithiophorite from other countries, and the formation, color, etc., all seemed to match.

Mr. Benn sent me down to see Dr. Charles Milton at the U. S. Geological Survey, who kindly ran a couple of tests, and determined the presence of cobalt and lithium. I later sent him several samples and he wrote me and stated that they were the best of this material that he had seen from this area. He had previously identified the same material, but had only been able to find it in the form of thin black coatings on quartz.

I made several trips back to the location and found a few pieces each time, but the winter rains made it pretty muddy digging. On my last trip I found a house sitting over my lithiophorite "mine". Fortunately I had pretty well cleaned out all the available material there, but I am fast becoming a follower of bull-dozers.

KYANITE OR DUMORTIERITE?

By S. B. BUTLER
Dept. of Chemistry, Queens College
Flushing, N. Y.

In the pegmatite dikes of the Manhattan schist (New York City) are sometimes found small blue or grayish-blue crystals, acicular in habit. Since they are generally too small for the usual hardness test, they are often called kyanite solely on appearances. Kyanite has been reported from a number of localities within New York City.

However, kyanite, according to some authorities, never occurs in igneous rocks (1), the collector should therefore be cautious in so naming a mineral found in a dike. The common dike mineral resembling kyanite is dumortierite. The latter is an aluminum silicate containing boron. In origin, it is similar to tourmaline, with which it is often associated. In Central Park (New York City), dumortierite has been observed enclosed by black tourmaline, forming perhaps the nucleus about which the tourmaline was deposited.

Fortunately, there is a simple test to distinguish the two. The New York dumortierite is highly pleochroic, meaning that light is transmitted in different colors and quantities in various directions in the crystal. While such observations are usually made with a polarizing microscope, in this case a 'scope is unnecessary, all you need is polaroid sunglasses.

Method: Detach a small fragment of a crystal, about 1/16" long. The mineral readily fractures into flat splinters. On a piece of stiff white paper, draw a large cross consisting of a vertical and a horizontal line, at right angles. Place an elongated particle beside the cross so that its length parallels the horizontal line. Now put on the sunglasses and carefully note the color. Good illumination is essential. Gently rotate the paper through 90 degrees, without disturbing the fragment. The horizontal line of the cross is now vertical. Observe the color of the particle again. Repeat this several times to be sure that a change in color is not overlooked. If the mineral is dumortierite, the particle will be nearly colorless in one position and at 90 degrees it will be almost black (actually, dark blue).

The purpose of drawing the cross is to provide an easily visible reference to indicate how far to rotate the particle. Without the cross it is very difficult to judge a change in position of a small particle.

When the fragments are very small, a lens will help. The change in color is more easily compared if two particles are used, placed closely together, with their long axes at right angles to each other.

I do not know if all polaroid sunglasses have the same orientation, but with mine the crystals are dark when in the vertical position.

REFERENCE

(1) Thin Section Mineralogy, Rogers and Kerr, 1st ed., p.256.

Bert A. Rhoades Featured

In the Feb. 1, 1948, issue of the *Rocky Mountain Empire Magazine*, appears a most interesting story (with 3 illustrations) about Bert A. Rhoades, of Lander, Wyo. The story was written by Bill Hosokawa, Denver Post staff writer, and covers some of the jade collecting activities of Mr. Rhoades.

The jade fields are on the slopes of the Green Mountains, in southern Wyoming (about 60 miles southeast of Lander). Among some of the many specimens of jade found was a 3,366 lb. boulder—the largest ever found in America. This specimen, found jointly by Mr. Rhoades and his wife, in the fall of 1943, is still intact and is one of the many masses (estimated to be between 15 and 20 tons) in the stockpile in the Rhoades' backyard.

Mr. Rhoades, a member of the R&M A, and his son, Ralph, operate the Rocky Mountain Jade Shop.

It is interesting to note that the first recorded announcement of jade in Wyoming appeared in the July, 1939, issue of *Rocks and Minerals* ("Nephrite in Wyoming", pp. 210-211).

COLLECTING AT SAINT PETERS DOME, COLORADO

By WENDELL MOHR
1036 So. Gilpin Street, Denver 9, Colorado

The zircons and other rare minerals found at Saint Peters Dome, in El Paso Co., Colorado, are not only well known but also make beautiful crystallized specimens, that any collector would be proud to have in his collection. The brown zircons, bronze astrophyllite, and greenish-brown fayalite (?) against a white quartz matrix make exceptionally fine clean specimens but collecting them is not as easy as describing them.

The locality may be reached by either the old stage road, (State highway 122), or the Corley Mountain Highway, (State 336), from Colorado Springs to Cripple Creek. The writer strongly recommends the C. M. Highway since the stage road is dengerously steep and devious. The best landmark to distinguish the ridge upon which the minerals occur is a deserted cabin at the side of the road and close to the tunnel that penetrates the ridge. It will be noted in the accompanying map of the area where the stage road intersects the C. M. Highway and the approximate relation of the mountain, road, campgrounds, and collecting area.

In late July, 1947, the writer accompanied by Mr. Guy B. Ellermeier, John Meissner, and Fred (Tyke) Meissner visited this locality with nothing more than odd reports to go on. Not knowing the region, we camped in the provided campground located on the opposite side of the mountain from the shoulder on which the mineral bearing dikes occur. It was later discovered that it is possible to camp much nearer the working area. Because of its proximity to Pikes Peak, it rains almost daily at Saint Peters Dome. This hinders work considerably and as a result, of the four days we spent there we got in about one full day's work.

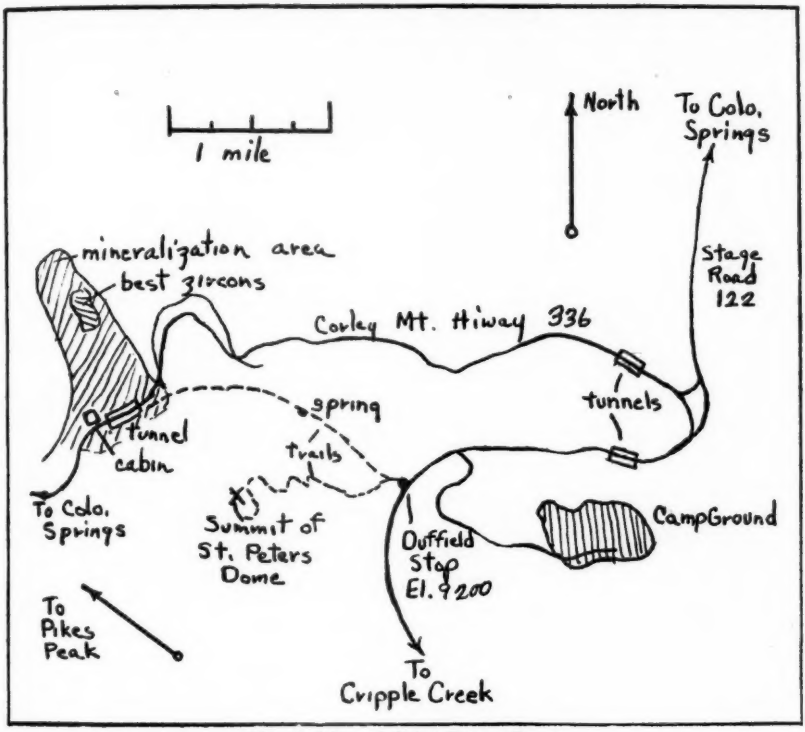
The whole of the mountain is covered with small prospect holes which, it seems, yielded absolutely nothing. To the southeast of the mountain there are several abandoned fluorspar and sphalerite mines, one of which is a huge cut in a shoulder of near pure fluorite. These mines, although investigated, brought no clean crystallized specimens which might have been caused by the compactness of the material. Massive fluorite may be found loose on the soil all over the mountain.

As soon as we stumbled upon the ridge where the best zircons are found it was evident that this was the spot because the ground was covered with weathered riebeckite crystals up to five inches in size. The mineral is generally referred to as riebeckite but Dana states that it is known to grade into arfvedsonite, a related amphibole. These crystals were not of a very good quality but better ones may be found by breaking the white bull quartz that is abundant near there.

The rock of Saint Peters Dome is composed chiefly of a reddish-brown granite called the Pikes Peak granite. This is composed mainly of quartz, feldspar, and biotite. Intruding into this granite are dikes some of which have crystallized minerals scattered throughout. A quartz center surrounded by feldspar seems to constitute the construction of them and the most minerals are found at the contact of the two. The most showy specimens were acquired when the zircons came in the quartz but this constituted only about one-fourth of those found. The others occur in a stained feldspar which may affect their beauty to some extent.

We found that the zircons are scattered all over the shoulder but that the best came in a dike running almost parallel to and about a half mile from the road. The distinguishing characteristics of most of the other dikes were present here and some work in the nature of a tunnel appeared at the foot of it.

Two forms of zircons were noted: a square prism capped by square pyramids and a crystal form lacking the prism so that it resembled a flattened octahedron. Of the two the latter was by far the most common. Both forms are of course in the tetragonal system but the amazing thing is that they were both found within two-hundred yards of each other. In size they



Sketch Map of Saint Peters Dome

range from pin heads to three-eighths of an inch but those that large were quite uncommon.

Found with the zircons was an interesting mineral which we think is fayalite. It is undoubtedly a member of the amphibole group and from available descriptions it seems to be fayalite. Upon exposure to the air for several hours these crystals turned from their original green color to a tarnished brown.

Astrophyllite, a well known but uncommon ortho-silicate, was collected here in long slender crystals that ranged in size up to four inches. Several boulders found near the zircon-bearing dikes were shot through with astrophyllite accompanied by many zircons. The matrix consists mostly of feldspar that is badly stained with iron. It was later discovered that the stain is easily removed by soaking the specimens in a solution of oxalic acid.

Several specimens were found by Fred Meissner and Mr. Ellermeier which were not identified. One of them is a small yellow hexagonal crystal that is about one-half of an inch in length and one-fourth of an inch across. It is opaque and is a real puzzler. Also found were several crude quartz crystals.

Although we didn't have too much time to work because of the consistent precipitation, I think that we will all verify the fact that we had fun and collected some fine specimens.

As we sat by the campfiire the last night we spent at Saint Peters Dome, John Meissner laid aside his ocarina long enough to sum up the situation; "We collected more specimens, and more puzzling varieties, and got rain soaked more often than any other place we ever collected." The writer is in complete agreement with John.

CITY OF SCULPTURE

By ANTHONY W. THURSTON
Veterans Hospital—Rutland, Mass.
Formerly Box 104, Swansea, Mass.

There were a few anxious moments while the Captain looked over our passes. Then, with a grin, he signed them.

"You know this isn't general practice of this battery," he said, "but with you rockhounds I might as well let you go. You'd go anyway." I smiled to myself, for this was not the first time he had given me the go-ahead for a day of collecting, only this time I had interested several others who had also requested leave. Just how I got a major, two lieutenants, and the battery clerk interested in rocks I shall never know, but there we were, bouncing out of camp in a three-quarter ton weapons carrier.

Our starting point was Rosignano-Solvay, a small summer colony on the Italian coast about 15 miles south of Leghorn. Our destination, Volterra, was a small hill town noted for its alabaster carvings; situated about 35 miles inland and well up in the Appennines, backbone of central Italy.

We drove about a mile down one of the few really good concrete highways, called Autostradas, to the Cecina River, then, turning inland on a dirt road following that stream up into the hills. Sharp curves, blind corners, and all the hazards a road has to offer were more than common and I thanked my lucky stars that there was very little traffic.

We passed many places where sedimentary rocks were exposed by erosion on the steep river banks, which had now become a small canyon, but with a limited time at our disposal, I dared not ask the driver to stop. A geological sketch of the region, which I had found in a bombed-out building, indicated that we were passing over Eocene, Oligocene, Miocene, and Pliocene strata in normal position but of rather irregular distribution. The Eocene and Oligocene I could not recognize as we sped along but the scattered patches of Miocene, which were becomming more and more common, were streaked with lenses of alabaster. The Pliocene too could be easily seen for it contained many broken shells, at times approaching coquina.

Now the dirt road, already much narrower and rutted, pitched up steeply, climbing in a series of switchbacks. Suddenly, rounding a curve we saw Volterra. It clung to a mountain high above the surrounding hills, and reminded me of a cat crouched on a pole trying to be inconspicuous in a conspicuous place.

Almost at once the topography changed, outcrops of solid rock melted into strange little clay hillocks all about six feet high. This odd formation covered the country side as far as I could see from the valley bottoms to the mountain tops. At first we were unable to understand its cause but soon we saw a pile of alabaster chips and on investigating, found nearly a square shaft some 30 feet deep. A ladder led down to a shelf and beyond that a tunnel slanted into the darkness from which came the faint clink of iron on stone. Evidently there was a thick bed of alabaster underlying the whole region and its decomposition, probably aided by mining over many years, had produced the little hills.

At last we entered the village square so typical of most Italian towns, with its cobbled surface, public well, wine shops, and ragged children who clamored for gum or candy. We inquired for the home of the master sculptor, as he is known in Volterra, for we had been told he would be the best source of information. This request was granted quite readily by several small boys who made it plain, however, that they expected to be rewarded for their assistance. The master's home, situated across from the "College of Alabaster," appeared no different on the outside than any other in town, but upon being admitted by the sculptor himself we noted many fine pieces of furniture not found in the average Italian home. We talked only a short time, for it required weighty translations by one of the

lieutenants to make the conversation understood by all concerned, then asked to see some of his work. He led us out through the garden in the rear, where broken, unfinished, or blemished alabaster heads, animals, vases and many other carvings rested on logs, stones, or simply beside the path. At the far end of his home was a basement workshop with several figures on benches in various stages of completion. I must admit that at this point I was not impressed, perhaps even a bit disappointed, for until now we had seen none of the highly polished carvings of which we had been told. Just then, however, the master beckoned us to a corner where a piece of dirty canvas covered a rather indefinite lump. Lifting this he uncovered a carving which made us gasp with surprise.

Here was a piece of work which lived up to, yes, even exceeded the stories we had heard. On a base carved to represent a leaf-littered forest floor, a superb stallion reared on his hind legs, head high, and forelegs pawing the air. The stone had been polished until it seemed to glow and had been stained a dark jade-green. Every muscle and tendon stood out in a natural way. Its mane and tail appeared to ripple as if in a breeze, and even the delicate contours of the eyes, ears, and nostrils appeared in perfect detail. Our host next uncovered a white, charging rhinoceros about two feet long which, like the horse, was accurate to the highest degree and polished like white porcelain. Following this we were shown an unfinished lioness reclining on a simulated ledge. Then he began to explain and demonstrate how the statues were made.

"The first step," he said. "is to make a clay model equal in every dimension to the desired figure. This is allowed to harden, then from additional clay a hollow cast is molded, which, in turn is used to mold a plaster working model. Next a suitable block of alabaster, free from cracks or stains, is selected and placed along with the model under an instrument similar to a pantograph but having a heavy needle, instead of a pencil, suspended at the end of each arm. These needles are marked along their sides in a series of graduations and a thumb screw locks them at any desired point."

Having explained this he took us to another part of the room and demonstrated on an incompleted statue. He placed the instrument with the needles over his work and allowed one needle to drop down, resting on the model. Then, after reading the depth, he snapped a small spring about the other needle at the corresponding graduation leaving the thumb screw loose. Now, with a small hand chisel, he began to chip away the stone, letting the needle drop bit by bit until stopped by the spring at the proper depth. The instrument was now moved a quarter-inch and the routine repeated. After many tedious hours, the entire surface would be covered; the work turned over, and the reverse completed. This would be followed by smoothing, sanding, and polishing by hand and colors added if desired. Our friend displayed several more pieces of his work as well as prizes he had won in many parts of the world. Then, since we wished to visit some of the other workshops, we left him, not forgetting to repay his generosity with a few most welcome American cigarettes.

Back in the village square more children clamored for candy and promised to show us many, many fine pieces of alabaster. One little fellow who claimed to know the best in town became our guide for a chocolate bar. He stated that the Germans had stolen so many of the carvings that now the artists confined their work to shops in cellars and attics. Therefore, in order to see good pieces, we had to leave our truck and follow him down into the dark, narrow alleyways that twisted like the gnawings of rats through the city walls. Once underway I wondered at the possibility of being led into a den of thieves remembering all the accounts of missing soldiers in strange towns. We were led across the square, through an alley, and up a long series of stone steps where sullen, mistrusting faces peered out of dark smelly doorways. At last we emerged into a loft over an old barn. Here were thousands of carvings,

large and small, simple and complex, colored and pure white, all the work of craftsmen highly skilled in the trade. There were ash trays, pen holders, table lamps, floor lamps with translucent alabaster shades, bookends, Madonnas, religious groups, animals, birds, and nude figures. There was such a vast number of figures to choose from that I could not decide which to buy. Considering, however, the rough handling the statuary would receive before reaching the States, I passed up the delicate work and selected the two semi-religious shown in Plates 1 and 2 at a cost of only $3.50 each. Both are tinted in natural color, stand about ten inches high and weigh about thirty pounds. By a strange coincidence it was later found that the figure shown to the left has a striking resemblance to a cousin of mine. So strong is this that friends and relatives notice it immediately.

As we left the shop, loaded down with what seemed to be a ton of stone, our guide asked whether we might like to see some of the sculptors at work. By this time it was growing late, but we decided to accompany him as there was little chance of our visiting Volterra again. This time we really went on a trip. Down through more narrow passages, down steps and through buildings to a place where the city clung tenaciously to the steep mountainside. Here in a little shop clouded by stone dust were five workers. They sat on high stools like dusty gnomes, their work before them on their knees, a small rectangular cap made of newspaper on each of their heads. As we came in they were working rapidly and hardly seemed to notice us, as, with small hammers and chisels, they kept up a constant tapping at the work before them. Unlike the master, they did not work from a plaster model, but having fashioned a piece, they copied it by eye, and by repetition became expert at a particular figure.

Each seemed to have one specialty to which he confined his work. One man was working on a small elephant with half a dozen others all alike besides him, waiting to be polished. Another carved the ears of a scottie dog, and a third carefully rounded the flanks of a lion. Most of the pieces in view were unfinished, for the increasing number of soldiers through the town had bought most of the surplus. I did find one, however, which I could not pass by. This is the terrier, shown in Plate 3, which seems to be begging for someone to play. He is about eight inches high, weighs about forty pounds, is of black and white mottled stone, and cost only $5.00.

Plate 1

Plate 2

Two beautiful alabaster carvings purchased by the author. Plate 1 has a striking resemblance to a cousin of the author's.

Back once more in the square, we rewarded our guide with a few more pieces of candy, and, as they say in the army, "We took off flying low."

Then began a ride I shall never forget. I held one carving under each arm and placed the third between my feet. At each turn I had to decide either to risk being thrown out of the truck or to let go of a statue and hope it would not be broken. We all arrived safely though, and I am inclined to think that it must have been the weight of the stones which held us to the road.

I spent the night packing my loot in empty ration cases padded with sawdust. Next morning I turned my troubles over to the Army postal service. Some weeks later a letter from home informed me that all had arrived safely with the exception of the little dog who had suffered the loss of a small chip on his nose. Now they rest in our front room where all may admire the skill of those Italian craftsmen high up in the Appennines.

I know I shall never see Volterra again, yet each time I look at these statues I shall see the skillful hands of my friends carving beauty from stone.

Plate 3

Another beautiful alabaster carving depicting a scottie dog at play.

Editor's Note: Volterra, a small city in the western part of Tuscany (in western Italy), has long been celebrated for its alabaster works—normally about two-thirds of its population is engaged in this work. Some of the alabaster is obtained in the neighborhood but the best grade comes from the mines of La Castellina, 35 miles south of Leghorn, a seaport, on the west coast of Tuscany.

Alabaster is a fine grained variety of gypsum generally snow-white in color.

Miloschite, a greenish blue chromiferous clay (resembling chromiferous allophane) is found in Volterra.

LOCAL "GLACIERS"

By SAMUEL C. BROWN
Stamford, Conn.

As we sit by the window during the last month, our attention is directed towards plenty of that pure white crystalized H_2O substance called snow.

Just outside my window, a small sloping roof is covered with snow that is at least 2½ feet thick from the storms we have had this past month.

As the sun in February is getting higher each day with a corresponding increase of heat, I observed that this mass is slowly moving down the incline and overlaps the eaves slightly.

On the surface of the mass of snow, the sun's heat together with the wind has caused an eroded surface of partly frozen melted snow.

On examination with a microscope, observed numerous hexagonal forms of crystals some were ragged and imperfect.

When the sun shone on this crystalline mass, all the colors of the rainbow were seen and the brilliancy was equal to that of a diamond.

However, if these hexagonal crystals were solidified and the brilliancy retained, what wonderful specimens the Rock Hounds, would have for their collections.

I noted several small pebbles near the edge of this "small glacier," whether they were carried from further up on the roof is a question; saw some faint scratches on the wooden shingles near the stones.

Numerous icicles have been hanging from the edge of the roof, one large one was approximately 24 inches long, and several inches in diameter.

While this weather is not conducive for mineral collecting, there are a few outdoor projects which may be studied such as the formation of icicles, formation of snow crystals, or the layers of snow. Truly water is a great mineral!

THE GEOLOGY OF LOWER MILFORD TOWNSHIP LEHIGH COUNTY, PA.

By CHARLES W. BROWN

Muhlenberg College, Allentown, Penn.

* * * Introduction * * *

Lower Milford township is a rectangular tract of land, six miles by three miles, that runs in a general northeast-southwest direction in the southeast corner of Lehigh County. It lies between the parallels of 40° 25' and 40° 31' north latitude, and between the meridians of 75° 25' and 75° 32' west longitude. Being in the southeast corner of Lehigh County, it is bounded on the southeast by Bucks County and on the southwest by Montgomery County.

Physiographically speaking, the boundaries of the township embrace a portion of both the Piedmont and Highland sections of the Appalachian province. The Triassic border is used as the line of demarkation, and it is with this particular relationship that we are interested in. Structurally, few geologists have been able to see eye-to-eye on the situation due to the complexity of the area. This, however, will be discussed in more detail in the section on structure, but I might mention here that the use of block diagrams has been employed because it is the author's belief that a picture is worth ten thousand words when it comes to explaining a problem in structural geology.

The village of Limeport, in the north corner of the township, is the only town that has been developed to any extent in the area. Communities such as Corning, Hosensack and Dillingerville are little more than a cross-roads with a general store that serves as both commercial and social center for the surrounding farm population. As humble as they may seem, the general stores are what you might call "God's gift to the field geologist". This is true in the sweltering summer season when their ice chests, filled with soda pop of various and sundry sorts, are as oases to the travel-weary wanderer. Reflecting back upon the summer's work, the author tends to forget, or perhaps overlook, the endless miles of hiking that were needed to cover the area, the gallons of sweat that poured from his and his comrade's brow as they plodded on in the steaming heat, and the periods of despair and discouragement brought about by unanticipated and seemingly unsurmountable field problems, hordes of relentlessly attacking insects, occasional skirmishes with hostile natives, and experiencing that horrible feeling of being lost in "1947" Pennsylvania while trying to follow a topographic map of the vintage of 1883. Yes, this is all over-shadowed by the fine fraternity that goes with the profession of geology, the light and gay spirit that prevails ninety percent of the time while we take nothing but our work seriously. It was remarked more than once by members of the field party that we should have had a stenographer accompanying the group at all times to record the priceless gems of humor which were constantly flowing from our fertile souls. If this could have been done, I have no doubt that it would have the makings of a "best seller" that would surpass all previous attempts at literature of its type. It is this atmosphere that enables the geologist to attempt and accomplish the seemingly impossible, like traversing the most rugged mountains in sweltering heat, plunging through underbrush that would make the most determined wild animal stop and think twice before entering, and scale perilous quarry walls just to check the dip and strike of the formation.

All of this is not meant to be an essay on or characterization of a geologist, but it is intended to impress upon the prospective field geologist the fact that field geology in college is not another course to reckon with lightly. It is more or less a series of existing conditions, a collection of attitudes of the participants, and a climax studded not only with gems of knowledge, but with gems of humor and a greater comprehension of life as it actually is.

* * * Topography * * *

The fact that the boundaries of Lower Milford township envelop small portions of two physiographic provinces, each being made up of rocks that differ in many respects, causes me to discuss the two areas separately in regard to topography and drainage. One must understand that there is no sharp line of demarkation distinguishing the Triassic from the old Appalachians in Lower Milford as the Reading Hills are of a characteristic late mature mountain type, and the structure of the Triassic hills is such as to make them resemble closely the crystalline highlands adjacent to them.

The Reading Hills, older Appalachians, or the crystalline Highlands, whichever you prefer to call them, are a chain of old worn down mountains with a concordant summit level. To be specific, I shall classify the Reading Hills as complex mountains in late maturity. No type of landscape offers a greater variety of interesting detail than a maturely dissected complex mountain mass. Here we see exposed the core, the very roots of the mountains. The various types of rocks and structures all affect the topography. The streams are in almost perfect adjustment with these rocks and structures. The original consequent drainage has been gradually replaced by streams which are largely subsequent. That is to say, there have been numerous stream captures whereby the subsequent drainage lines have grown at the expense of the earlier consequent pattern. In their late maturity, the Reading Hills have passed the period of greatest relief, but the streams are still cutting down into the original structural depressions and intermontane basins discovering various types of rocks from place to place, and exhibiting alternating stretches of young and mature drainage characteristics. Gorges occur where the streams have been superimposed upon resistant rocks; open valleys occur where the rocks are weak. This is exemplified in the courses of Hosensack Creek, Perkiomen Creek, and Indian Creek. Where they flow down through the gneissic regions the valleys are typically young, but when they strike the more resistant sedimentary quartzites, sandstones and limestones, they take on more open mature features. This is particularly noticeable in the area south of Bald Hill.

It is my belief that the streams are superimposed upon the crystalline rocks as a result of previous peneplanation. That is to say, they have cut down through weaker sediments, and retained their courses when they struck the crystalline formations.

Generally speaking, the drainage pattern falls into the "dendritic" class of crystalline rocks, which differs slightly from the more "leafy" dendritic pattern of horizontal rocks. The trend of the stream flow is roughly a southerly one, and the local streams join together in their journey to Delaware Bay and the ocean.

In conjunction with the relationship between Perkioman Creek, the local topography and drainage, I would like to quote from an article by Professor Richmond E. Myers, as he brings a pertinent point to light in his theory concerning the creek's valley and its origin, which I think will be of extreme interest to the reader.

"Another interesting feature of this region is the valley of the Perkiomen Creek as seen looking southward from the Spring Mountain House, or northward from the lookout on top of the mountain. A cardinal principle of geology is the fact that a valley is excavated by a stream, but it does not follow that the stream now flowing through the valley was the one that carved it. It is believed by some students that the present Perkiomen was not the stream that eroded the valley through which it flows. This assumption is made on the grounds that it is far too small to have done the job of cutting through the several trap ridges which it crosses through fairly narrow ravines or gaps, and developing such a wide valley elsewhere. If not the Perkiomen, what stream might have done the work? The suggestion has been made that the Lehigh River at one time flowed south through

Leibert's Gap just west of Emmaus in Lehigh County, and that the Perkiomen Valley was originally the valley of the Lehigh, which stream was later deflected to the northeast at Allentown. This theory has much to support it, but final proof is lacking."

In the Triassic, the drainage is relatively simple. The streams are consequent; that is to say, they flow in the general direction of the slope of the land mass towards the sea. On the map we see this exemplified by Molasses Creek, Licking Creek and Hazelback Creek as they flow southeastward out of Lower Milford township through the shales and fan material of the Triassic.

The topography is much less rugged than in the Reading Hills, and we find it made up of a low rolling plain that is broken occasionally by trap rock ridges. Being an area of low relief, the streams are little more than rivulets running down gullies with the larger ones slowly meandering across the flat areas. Their erosive power is limited primarily to flood periods, but during those stages they have been able to transport large boulders of trap rock and crystalline material over considerable distances as is observable in their beds at the present. The pattern most closely resembles the dendritic one of horizontal rocks, with the trap rock ridges being the only controlling feature to the flow.

* * * Historical Geology * * *

The rocks which we have studied this past summer represent more than a billion years of geologic history. The pre-Cambrian rocks present in Lehigh County, although the two earliest formations were not seen in the field in the area under discussion—namely, the Franklin and Moravian Heights, represent what is believed to be the oldest rocks on the North American continent. As for the age correlation, it can be said that assigning pre-Cambrian rocks to a definite age is rather a precarious job. A very hazy picture is presented to us in historical geology prior to the Cambrian because of the relative absence of sedimentation, and the presence of extensive metamorphism in the old igneous rock forms. Our colleagues who worked Upper Milford township can testify to that, in that they had a tedious job in mapping patches of the pre-Cambrian metamorphic material with only scattered remnants of the Hardyston formation to break the monotony of the formations. In Lower Milford township we ran into the same kind of a problem along the northwest border, but it wasn't of any extent comparable to the situation in the adjoining township.

There are gaps in our geologic history, as much of the material is covered up. In years to come, with the uncovering of many unsolved problems, these gaps will be filled by future students of the science. Theories that were quite plausible a few decades ago are now thought to be obsolete. It is this never-ending quest for information that leads us to new and greater fields of discovery, and friendly competition is perhaps the greatest motivating factor in the field as it drives men on to higher and better goals. This is a prime factor to be remembered in any scientific study for we are only mortals trying to uncover and solve the greatest riddle ever presented to Man—the origin and changes of his terrestial globe.

The earliest record that is found in Lower Milford township is the Pochuck gneiss. Although the older formations of the Franklin and Moravian Heights are found in other parts of Lehigh County the Pochuck is the oldest formation which we deal with in our area. This basic rock in the past has been considered of possible partial sedimentary origin and in part to have been derived from the metamorphism of a gabbro or diorite-gabbro type of igneous material. D. M. Fraser feels that it is entirely of igneous origin, and that it may have been formed by the metamorphism of a gabbroic type of rock but it could also have been derived from the metamorphism of a series of andesite and basalt lava flows. The Pochuck has tentatively been assigned to the Huronian period.

Later Proterozoic time saw the intrusion of an acid type magma. These rocks were known as the Byram gneiss, and the ir-

regular contact between the Byram and the Pochuck leads us to believe that the action was one of a deep-seated nature. Following the intrusion of the Byram there was extensive erosion over a period of a long time before the first of the Cambrian sediments was laid down. The terrific metamorphism which the Byram has undergone makes us form this conclusion.

At the beginning of the Paleozoic era there was great down-warping, and a trough was formed that ran in a general northeast-southwest direction with a great land mass known as Appalachia standing to the southeast approximately where our continental shelf now lies. Into the sea that occupied the trough were poured thousands of feet of sediments that now constitute the Paleozoic rocks. The first of these, the Hardyston formation, was deposited on a freshly eroded gneissic surface. Following the Hardyston came the deposition of a more calcareous sediment which also contained much sand and argillaceous sediment. This now forms the Tomstown formation. Still later in the Cambrian period, a more calcareous ooze, was laid down with less sand, and that formed the Allentown formation. How much longer this deposition went on uninterrupted, is not known. In the immediate vicinity there was a gap between the Allentown and the Martinsburg, as is disclosed in a quarry in Limeport where the shale rests unconformably on the limestone.

At the end of the Paleozoic came a tremendous period of uplift and faulting and folding that caused the complex structure that we see today in the area. This is known as the Appalachian revolution.

The next recorded event is in the southern part of the county in the area in which we are interested. A basin or trough was formed into which thousands of feet of sediment were deposited under arid conditions. These deposits were mainly arrenaceous or argillaceous as they now form the Triassic sandstones and shales. Near the margin of this trough alluvial fans were formed in flood seasons, and they are in evidence today in the form of fossil fans known as fanglomerates. Towards the close of Triassic sedimentation there were intrusions and surface flows of basic igneous matter that now form our traprock hills. This is the last time that igneous action has taken place in Pennsylvania.

Althoungh the glacier had no effect upon the area that we study, in Cenozoic time the area was reduced to a peneplain known as the Schooley Peneplain, and the topography that is in evidence now is the result of rejuvenation due to an uplift that renewed the agents of erosion.

(*To be continued*)

Gizzard Stones From Oregon Turkeys Shown

SPRINGFIELD, VT.—On exhibition at the Springfield Library is a collection of stones taken from the gizzards of Oregon turkeys, and presented for observation by Harold Chandler of the Springfield Mineralogical Society.

Mr. Chandler, in sorting the stones, which range from pea size to large pebbles states that he found specimens of rose quartz, lava, jasper, and quartzite, with window glass of various shades among the gizzard stones.

"Turkeys definitely show a preference for dazzling stones," said Mr. Chandler and told of many instances where gold ores have been found in the craws of the birds, which have led to the discovery of new deposits and veins of the precious metal, in the feeding grounds of the gobblers. One of the richest deposits in the Australian gold fields, he said, was opened after examination of gizzards of the wild turkeys feeding in that region.

Gizzard stones, said Mr. Chandler, serve as choppers for the food eaten by the birds, and are necessary to the health of the flock.

Too Many Ads!

Editor R & M:

While advertising is important if a magazine is to survive, I notice that the ratio of articles to ads seem to diminish with each issue.! We subscribe for mineral and geological interest, primarily—advertisements come next!

Abe Suher
Springfield, Mass.

Feb. 6th, 1948

SECOND ANNUAL DINNER MEETING OF THE MINERALOGICAL SOCIETY OF THE DISTRICT OF COLUMBIA

By PHILIP R. COSMINSKY
Falls Church, Va.

An event of interest was the second annual dinner meeting of the Mineralogical Society of the District of Columbia, held at the Parrot Restaurant, Washington, D. C., on Friday, January 16, 1948.

Sixty persons, members and their guests, sat down at 7:30 to a chicken dinner that held their interest and attention until the last spoon dropped.

The tables were tastefully decorated with bouquets of yellow chrysanthemums and blue asters, and the head table was further enhanced by the display of two fine mineral specimens. One of these was a large piece of atacamite on drusy quartz from Atacama, Chile, and the other was a fine specimen of azurite and malachite from Bisbee, Arizona. Both were real old time collector's items.

The place cards were of more than passing interest, being a small mineral collection in themselves. They consisted of a 2½ by 3½ inch double folder of heavy white paper, on the front of which appeared the seal of the Society, under that the name of the Society, the name of the restaurant and the date. The remainder of the card was divided into twelve spaces and these spaces contained small specimens of the following minerals. Azurite from the Kaibab Plateau, Arizona; clear quartz crystals from Crystal Hill, Orange Co., Pa.; fluorite from Northern Kentucky; Magnesite from the Dyer Quarry, Delight, Maryland; Galena from Joplin, Mo.; Jasper from Antelope, Ore.; asbestos from the Thetford mines, Quebec; microcline variety amazonstone from Amelia Court House, Va.; gypsum from Utah; calcite from the Joplin, Mo., area; chalcopyrite from Bingham Canyon, Utah; and last but not least, a specimen of lignite from Queen's Chapel, Takoma Park, Maryland, which was included for the express purpose of representing the mineral resources of the District of Columbia.

These cards were the work of the dinner committee, Mrs. Helene Haliday chairman, assisted by Mr. Wm. B. Haliday, Mr. and Mrs. James H. Benn, Mr. and Mrs. French Morgan, Lt. Col. and Mrs. R. L. Mitchell, Miss Jean Campbell, Mrs. Frances D. Madison, and the writer. The names of the diners and numbers in sequence were added by hand, and the minerals were cemented to the cards by the members of the committee. The cards were designed and made by Mr. Haliday, who used his knowledge of photography with excellent results. Mr. and Mrs. Haliday have many hobbies other than rocks and minerals, such as hiking, photography, ceramics and others.

Immediately after the dinner a short business meeting was held. After the reading of the minutes of the previous meeting the nominating committee, Mrs. French Morgan, Chairman, tendered a slate of candidates for the ensuing year. This list was approved by the meeting and the secretary was instructed to cast an unanimous vote for the entire slate. The officers elected for 1948 being Lt. Col. J. J. Livingston, president; Lt. Col. R. L. Mitchell, vice-president; Mr. Lancaster Lowry, secretary-treasurer; and Capt. B. J. Chromy, assistant secretary-treasurer.

The retiring president, Mr. James H. Benn, turned over the office to Col. Livingston and introduced the Master of Ceremonies for the evening,—your writer. The fun session was started with a drawing for door prizes. Duplicate numbers of the ones on the place cards were placed in Mrs. Benn's beautiful chapeau and the winning numbers were drawn out by Master Joel Shappiro, the most recent and youngest member of the Society. Miss Jean Richmond was the winner of the first prize, the aforementioned atacamite specimen. The malachite-azurite went to Lt. Col. Mitchell as second prize. The

three bouquets from the tables went to Miss Mary R. Schultz, Mrs. Otto M. Ireland, and Mr. R. J. Violette.

The four charter members of the Society present were introduced to the gathering; Miss Mary Schultz, Mr. C. M. Davis, Mr. French Morgan, and Lt. Col. J. J. Livingston.

Following this, Dr. Titus Ulke, old time geologist, Indian fighter and western pioneer was introduced and he gave a short talk on his early days, his education here and abroad, and his studies under now great names in geology and mineralogy.

A short intermission was held, while the tables were removed from the room and the chairs re-arranged for the movies to follow. Several of the more hardy members adjourned to the bar for a little snake-bite remedy, perhaps in preparation for the scheduled trip to the far west.

After the members and guests were reseated, the retiring president was presented with a small gift as a token of appreciation for his two terms of excellent service. This gift turned out to be a small hand carved "Rock Hound" with Herkimer diamond eyes and a small chunk of pegmatite hanging from his neck by a gold (?) chain. Mr. Benn accepted the gift with the remark that he now felt himself to be a true member of the Order of Rock Hounds.

The feature event of the evening was a showing of "The Marathon of the Morgans" in technicolor; projection by Mr. Haliday and sound effects by Mr. Morgan. Two excellent reels of film took the assembly over the ground covered by Mr. and Mrs. Morgan on their lengthy trip to the coast and return, made during the past summer and fall. These pictures included all phases of the trip, from actual prospecting to scenes of breakers along the Oregon Coast. Of special interest were the shots of the Devil's Tower in Wyoming. Someone in the audience wanted to know if Mr. Morgan brought that one back for a specimen.

After the completion of this movie and while Mr. Haliday was changing projectors, the M.C. endeavored to show a handkerchief trick, assisted by the new president. The trick failed miserably when the M.C. found a "diamond" about the size of a walnut in Col. Livingston's hankie. This diamond had been "reported" as lost in the building a short time before. The Colonel was as surprised as the M.C. and joined the group in a loud chuckle.

Next came a showing of 2 x 2 slides, depicting rock hounds in action, with vocal assists from the takers of the various pictures shown. Immediately after this, the meeting was turned over to the president who accepted a motion to adjourn until the next regular meeting on the third Friday in February at the U. S. National Museum.

To repeat a much used phrase, a fine time was had by all, and all look forward to the next such event after another year has rolled by.

H. Sussbach and Co. Enlarge their Quarters.

In order to properly cope with the large volume of correspondence and direct sales, the firm of Herbert Sussbach (successors to Stephen Varni Co.) have added two additional rooms of office space to their present quarters at 15-17 Maiden Lane, New York City. This new change now allows a much larger display area for visiting dealers and collectors.

Together with the personal supervision of Mr. H. Sussbach, the office staff now consists of five additional assistants plus an outside salesman. Mr. Sussbach's brother, W. R. Sussbach, is now permanently quartered in Ceylon concentrating on buying rough moonstone and medium star sapphire. Under this new arrangement a more efficient service is anticipated.

Darned Satisfied!

Editor R & M:

Enclosed are $3.00 to keep me on your mailing list for another year.

I have no gripe—darn it!

I have no suggestions on how you should run the magazine—darn it!

I am just too darn well satisfied with *Rocks and Minerals* as is—you just keep it coming every month—darn it!

Yours in SiO_2X1s
Donal Hurley
Little Falls, N. Y.

Jan. 28, 1948

WAVELLITE LOCALITY CORRECTED

By WOODLAND G. SHOCKLEY

I note with interest the article on wavellite on page 37 of the January issue of *Rocks and Minerals*. In the article is a statement concerning the occurrence of wavellite at Magnet Cove, Ark. I am writing you to correct an erroneous impression which I have seen in other literature as well, but the origin of which I have not been able to establish. The fact is, to the writer's knowledge there is no known occurrence of wavellite in Magnet Cove. This statement is based on the writer's personal experience in this area for over seven years and association with many other mineral collectors who have intensively investigated the minerals of the Cove.

It is entirely probable that specimens of wavellite from other Arkansas localities have been mislabeled with the well known name of a famous mineralized region. Perhaps the best known locality for wavellite in Arkansas is about 20 miles northwest of Hot Springs near Cedar Glades; the exact location is called Dug Hill, but the names Avant and Buckville are sometimes used to describe the occurrence. The wavellite here is found in seams of a dense gray rock and is in radiating green nodules. Truly excellent specimens are found here. Also at this locality is a bright green variscite, having the same mode of occurrence as the wavellite.

There is a minor occurrence of wavellite on Buckeye Mt. in Polk County, Ark. The material here is in small green radiating nodules, associated with variscite, and coating a dark brown manganese ore. The minerals fill crevices and vugs in the ore. Other phosphate minerals are found in this region. In addition a very small amount of white wavellite in radiating nodules was found some years ago at Batesville, Ark., on manganese ore. Mr. George Rosenthal of Little Rock was the discoverer of this material. The specimens are excellent but small.

It is hoped that this little memorandum will help clear up the impression, apparently prevalent in the mineralogical fraternity, that Magnet Cove is the place in Arkansas where the good wavellite comes from. It just isn't so!

MISSISSIPPI AGATES

By ROCKHOUND WALDO E. FORD

RFD #2, Wesson, Miss.

After I became interested in rocks and minerals (recently), I recalled childhood days when my mother showed me what she called "Mississippi Agate". I am going to give them a new name, "Mother's Agate", in her honor. These agates were found in what is called May branch, a stream of water issuing from a clay bank, bordering and east of the Wesson cemetery. However, today, they are all gone from this location and so I extended my search further east.

I found a couple of agates in the road bed, six miles east of Wesson, on the Joe Furr Bridge Road. After a short time of hunting, found a small plot of mixed clay bank with various type of rocks among which were a few of "Mother's Agate" in pebble form.

My search for agates took me to various other places where I found a few more nice specimens in Copiah and the neighboring Lincoln County to the south.

The agates are chiefly gray in color, nicely banded and vary in size from tiny up to 3x3 inch pebbles. They should take a nice polish and thus become a collector's item, not only for their beauty but also for being the State of Mississippi's first gem stone. If I can get a nice supply of these agates, will advertise them in *Rocks and Minerals*.

For those interested in localities, Wesson is a small village of about 1,000 pop., in southern Copiah County, in southwestern Mississippi. Copiah is an Indian word, meaning "Calling Panther". Lincoln County was named after President Abe Lincoln.

HOLDEN ON "GROWING CRYSTALS FROM SOLUTION"

By CHARLES A. BELZ
Secretary, Philadelphia Mineralogical Society

The little quartz wafer used in Radio and Telephone, seems such a trivial thing —so few know about it, and yet without an abundant source of these wafers, the endeavor to provide long-distance communications would be severely handicapped.

What is being done, synthetically, to meet this need was the subject of a talk given to the members of the Philadelphia Mineralogical Society at their January meeting by Mr. A. N. Holden of the Bell Laboratories. There is surely no one better qualified to discuss this subject than Mr. Holden since he has been intimately identified with this research work, and was indeed largely responsible for its inauguration long before World War II. The title of Mr. Holden's address was innocently enough "Growing Crystals from Solution". While practically every chemistry student has attempted to grow alum crystals from solution and there is nothing new about the mere idea of growing crystals, the Bell Laboratories has succeeded, after years of trial and failure to grow organic crystals that are an acceptable substitute in a large measure for the natural quartz.

The function of a quartz crystal in a telephonic circuit is that of a filter. The filter eliminates separate circuits for long distance 'phone conversation' and is used with co-axial cables carrying many conversations at the same time. Some screening device obviously is necessary to unscramble this Babylonian potpourri. Of the many filters tried to accomplish this, none has succeeded so well as a wafer cut out from a quartz crystal of suitable quality.

Quartz can do this because of its piezo-electric response, which as every mineral student knows, is that virtue of vibrating in an electrical field. The elasticity of the crystal is such that when the electric charge is removed, the deformation disappears. If the charge is applied and removed in ever quickened alternations, a point can be reached where the physical responses get out of step so to speak, and the crystal begins to "kick back". However, a wafer can be cut to respond or vibrate in exactly the same frequency as that of some definite current oscillation. It might be thought of as vibrating in resonance with the applied current, and the current will pass through the crystal unaffected by its presence in the circuit. If two currents of different frequencies are transmitted over the same wire, a crystal of the frequency of one of them introduced in the circuit will pass that one, but not the other. If two crystals each designed for the frequency of its respective current are introduced, each will screen out its own current, but not the other. In actual practice, hundreds of currents of different frequencies have been transmitted over one co-axial circuit. Naturally the apparatus necessary to accomplish this isn't simple, and while its intricacies and cost are not inconsiderable, such a device does become economical as compared with the cost of installation and maintenance of separate copper wire circuits.

The demand for such quartz oscillators is now so great the search was begun for a method of making synthetic crystals not only of quartz, but of any other substance that might possess similar piezo-electric characteristics. Some were found that gave satisfactory performance within narrow ranges of temperature; others were found with other limitations. Finally after Bell Telephone physicists and engineers were satisfied with the operating characteristics of ethylene diamine tartrate crystals, it became the problem of the chemists and production men to develop a technique for growing them artificially and economically to a size where the proper size plates could be cut. This problem has been solved to the extent that the Western Electric Company, which is the manufacturing unit of the Bell system, is now growing crystals at the rate of over two tons per week.

Mr. Holden described the various stages in their approach and final solution of this problem. To begin with an elementary fact,—for every chemically pure solution of a substance, there is a temperature at which that solution is saturated. If the temperature of the solution is raised, more of the solid can go in solution. If on the other hand the temperature of the solution is lowered, the solution becomes supersaturated for that temperature, and some of that material which was in solution will be precipitated. In like manner, if some of the solvent is evaporated, the housing shortage here also is such that part of the solute whose house disappeared, has no place to go, and it finds itself "out on the street". Material precipitated from a supersaturated solution materializes in its crystalline form.

If this were all, the growth of crystals would be easy, but from our experience with alum crystals we find that such a natural crystallization results in a motley assortment of crystals of all sizes, tumbled together and intergrown so haphazardly that it would permit cutting plates from only a very small percentage of the crystals produced. Some method of control during their period of growth was obviously a prime requisite. Attempts at controlled evaporation proved to be a dismal failure because even with all the refinements of laboratory technique, the evaporation rate was erratic, and any improved performance on a production basis was considered impossible.

The alternative of temperature control, after many failures, was finally conceded to be at least a laboratory success. The first attempts to grow crystals in a still solution from seed suspended by a thread produced some disappointing results. On lowering the temperature, as with evaporation, the crystal began to grow beautifully for a time, then cease its regularity and proceed to grow at random on different faces, and in different directions to produce a crystal quite useless for the purpose intended. A close study of the solvent by indirect light, and by other methods, disclosed the fact that there were perceptible currents set up along the faces and edges of the growing crystal. The cause of these currents was explained as follows: As the material crystallized out of solution, the solvent immediately adjacent to the face became impoverished, became less dense, and being therefore lighter, inaugurated a flow upward resulting in a varying degree of saturation along the upper portions of the crystal, which in turn caused an irregular growth varied by the local intensities of saturation.

The obvious answer was circulation of the solvent. An attempt to accomplish this was made by building a tank incorporating a rocking motion so that the solvent could be sloshed back and forth over the growing crystals, thus preventing the formation of differential saturation currents. This method however was found to be objectionable due to the difficulty of maintaining adequate temperature control, and it was also discovered that this sloshing action caused a disturbance of the crystallizing film along the growing faces. In addition there was noted an increased tendency to objectionable local evaporation resulting in the production of undesirable seed crystals.

Another scheme to circulate the solvent was tried by introducing a mechanical stirring apparatus, but this resulted in the formation of crystals on the vanes of the stirrer, where they soon became most objectionable. This tendency eventually suggested the idea of attaching the seed plates directly to the vanes of the stirrer in the first place. The arms were arranged so that the seed could be easily attached, crystals of desirable size grown, and readily removed, and they were designed to revolve at the rate of 15 r. p. m. with a reversal in direction every half minute.

This method proved highly successful as laboratory procedure, but a production difficulty was anticipated in attempting accurate temperature control, which meant a uniform rate of decreasing temperature, over batteries of large tanks. This difficulty wes met by designing an installation where it was possible to maintain from an outside source, a continuous supply of a controlled super-saturated solu-

tion at some constant temperature circulating through the growing tanks. By thus maintaining the liquor surrounding the crystals at a constant and uniform degree of supersaturation, there is a constant replenishment of the material as it is being withdrawn from solution by the crystal growth. As might be expected a sudden increase in the degree of supersaturation results in a veritable snowstorm of seed crystals which settle to the bottom.

One of the characteristics of EDT which make it well adapted for growing in solution is its strong polar character. The crystals grow rapidly along the c-axis. Seed consists of a flat plate cut from some previously grown crystal and cut at right angles to the c-axis. Mr. Holden showed slides to illustrate the initial growth across the face of small pyramids, or "tents", which, as they increase in size, merge and grow vertically as a prism, usually with pyramidal terminations. Mr. Holden stated that experience confirms the theory that growth along an atom's plane of a crystal face must be completed before growth on a new plane is begun. He showed a slide illustrating an experiment in which the plate had been cut at an angle of one degree off the natural pyramid face. The photograph clearly showed how initial growth first finished the incompleted layers along the bias-cut face until the one degree wedge had been completely filled before continuing growth in the normal way, layer by layer. When the cut was made at the exact angle of the pyramid face, normal growth began immediately.

Many interesting phenomena were encountered in the course of this experimental work. Why did some solutions seem to promote the growth of needles? What could be done to overcome this and stimulate lateral growth? On an assumption that a change in the hydrogen ionization would have some effect, the solution was acidified, and it was found that this change did promote sidewise development. But it was also noted that the presence of iron in the solution hindered lateral growth since on its removal the crystal also grew in girth. The addition of chromium was discovered to cause the formation of pyramidal faces. The distinctive light green stain was clearly seen at the face indicating adsorption, since no trace of chromium could be found in the body of the crystal.

Mr. Holden illustrated his description of the technique of growing crystals with many slides showing apparatus and the various stages of the process, and also brought along specimens to show the kinds of crystals produced. His discussion aside from its timeliness as an up-to-the-minute report of a scientific achievement in the interest of public service, was of absorbing interest as a practical application of our knowledge of crystallography. Crystal growth has always been a fascinating subject to those interested in minerals. The student of Mineralogy very quickly finds himself confronted with the facts of crystal existence, their beauty, their complexities and mysteries. While the natural crystals with which we have a more intimate acquaintance are accidents, or rather incidents of nature, it is of no casual interest to learn about crystals that are not a haphazard occurrence, but are grown with a purpose, to predetermined sizes, of specified quality, and very definitely prescribed characteristics.

Odd Prospecting Methods

A recent letter to Phillip R. Cosminsky, of Falls Church,Va., from Sgt. Robert Hartmann, USMC, stationed at Agana, Guam, contains the following interesting paragraph:

"Out here (on Guam) all I've managed to find are some massive calcite and golden calcite. I've developed a rather unique method of detecting it. It is usually found in vugs in coral limestone. The ants out here on the island of Guam live in the vugs so whenever ants are seen crawling over a special rock that's the one I investigate. It seems to work out pretty well."

Sgt. Hartmann is a member of the R & M A and we hope he will have an article for us on the minerals found by him on Guam.

WORLD NEWS ON MINERAL OCCURRENCES

(Bureau of Mines **Mineral Trade Notes**, October, 1947)

I. METALS

BAUXITE

BRITISH WEST INDIES.—Recent discoveries on the island of Saint Lucia indicate the existence of large deposits of good-quality bauxite. Samples from the deposits are being analyzed by the Demarara Bauxite Co.

(Vice Consul Henry L. Taylor, St. George's, Grenada.)

CHROMITE

IRAN.—Chromite was first produced in Iran at the outbreak of World War II when imports of foreign ore were cut off. Four thousand tons of chromite were mined, transported to Tehran, and manufactured into potassium bichromate in the Iranian years 1321 (March 1942 to March 1943) and 1322 (March 1943 to March 1944). Ore reserves are estimated at 100,000 metric tons. The cost of manufacturing acid from local ore proved too high to compete with imported products, and the mine was closed.

(Third Secretary of Embassy, John B. Crume, Tehran.)

TURKEY.—Output of chromite by the Guleman mines during the second quarter of 1947 totaled 35,701 metric tons.

(Third Secretary of Embassy, William C. Lakeland, Ankara.)

COPPER

IRAN.—Copper is the principal mineral export of Iran and occurs in a number of localities, the most important of which are Abbasabad and Zenjan in the north and Anarak in the central part of the country.

The Abbasabad mines have been worked for many years by open-cut methods. Early in 1947 the mines were closed because of the high cost of production and the diminishing value of the ore. Mines formerly operating included Labb-Kall, Asia-Deene, Bozorgue, Daman-Chalha, Hamami, Choghondar-Sar, Gour-Khan, and Baghloo.

The Baitchy Bagh mine, the most important in the Zenjan district, was closed when the Russians occupied Iran. Reserves at the time the mine was closed were estimated at 215,000 metric tons of ore containing 2 percent copper.

In the Anarak district the Talmessi, Sebraz, and Talkhe mines have been closed because of the high cost of production. Other mines operating in the district include the Bagherogh and Meshkani.

(Third Secretary of Embassy, John B. Crume, Tehran.)

MALAYA.—During the Japanese occupation, Pahang Consolidated, Ltd., produced blister copper from copper minerals found in the tin-bearing lodes at Sungei Lembing. The blister copper was sent to Singapore for electrolytic refining. Production of metallic copper proved uneconomic; a total of approximately 160 long tons was produced.

(Annual Report on the Administration of the Mines Department and on the Mining Industry of the Malayan Union for 1946.)

SWEDEN.—A new deposit of copper ore is reported to have been discovered near Ravlid bog in Lycksele Parish.

TURKEY.—The Ergani mine produced 32,491 metric tons of copper ore and 2,158 of copper metal (smelter) during the second quarter of 1947. Exports and domestic sales during the quarter aggregated 71,336 tons of ore and 4,640 tons of metal.

(Third Secretary of Embassy, William C. Lakeland, Ankara.)

IRON

IRAN.—The chief iron-ore deposits in Iran are at Semnan, Zenjan and Bafgh, southeast of Yezd.

The iron-ore deposits of Semnan occur in two separate districts, one 12 kilometers north of Semnan, and the other 60 kilometers east. Deposits in the northern district are mostly magnetite in eruptive rocks while the eastern deposits are mostly hematite and limonite in sedimentary rocks.

In the northern area mine 2 is a vein 40 meters long and 8 meters thick, occuring in the contact zone of two eruptive rocks, green andesite and dacite. Proved ore reserves are 80,000 metric tons.

In the eastern area the ore body of

Sheikhab East is pseudo-stratified, with a thickness of 10 meters. The length of the outcrop is 120 meters. Ore reserves are calculated at 200,000 tons minimum. The Sheikhab West No. 1 ore body covers an area of 4,000 square meters and has a thickness of more than 30 meters. The deposit can be worked by open-cut methods, but the ore is low-grade.

Surveys were made in 1943 in the Khan-Gharadash district, 45 miles southwest of Zenjan. It is estimated that 1,600,000 tons of ore might be extracted in this region. No mines have been developed.

(Third Secretary of Embassy, John B. Crume, Tehran.)

MALAYA.—The principal iron-ore deposits in Malaya are found in the States of Kelantan, Trengganu, Pahang, and Johore. Mining on a large scale began in Johore in 1921, in Trengganu in 1925, and in Kelantan in 1937. The Pahang deposits were discovered just before World War II. All mines were Japanese-owned, and the ore was exported to Japan. Since cessation of hostilities active mining has not been resumed, although the deposits still contain a considerable quantity of ore.

During the war, mining was confined to the States of Trengganu and Perak. The Bukit Iron Mine, Dungun, continued to operate, and two blast furnaces were built. As coke was not obtainable, charcoal was uesd in the furnaces, which proved to be extremely expensive. About 3,500 tons of pig iron were produced from these furnaces.

In Perak the hematite deposit at Tambun was worked and some smelting done.

Of the 162,965 tons of iron ore produced from 1942-45, 120,000 tons were shipped to Japan.

A blast furnace was built and operated by the Japanese Government at Johore Bahru until April 1945, when it was transferred to a Japanese company. No record of the operation is available. Pig iron also was produced in Taiping and Ipoh.

TURKEY.—Iron-ore output by the Divrigi mines during the second quarter of 1947 totaled 76,415 metric tons. Exports during the quarter aggregated 48,492 tons.

(Third Secretary of Embassy, William C. Lakeland, Ankara.)

LEAD

IRAN.—Lead deposits have been found in many Provinces of Iran, none of which is large or contains high-grade ore. Six mines are operating under private management—two small mines near Damghan, Chah-Karbuzeh and Nekhlak at Anarak, Afshar in Azerbaijan and another one near Yezd. The annual output of these mines is about 300 metric tons of metallic lead.

At the Chah-Karbuzeh mine surface and shallow mining has been carried on for years. Present workings have reached a depth of 90 meters. The ore is stored underground, and the low-grade ore is used for filling workings. Three tons of run-of-mine ore are produced daily, from which 1.5 tons of ore containing 65.4 percent lead and 5 percent zinc is hand-sorted. Smelting is done in a crude furnace burning charcoal brought some 60 miles across the desert by camel train. Production of metallic lead averages about one half ton a day.

The Nekhlak mine workings have reached a depth of 300 meters. A primary selection of ore is made underground. The average output of run-of-mine is 200 tons a month. Hand selection at the surface reduces this to roughly 54 tons of ore containing 20 to 25 percent lead. Smelting is done in a shaft kiln having a capacity of 10 tons daily. The smelted ore is refined in a concrete pan, wood-fired, and two grades of lead are produced, 97.5 and 99.7 percent.

(Third Secretary of Embassy, John B. Crume, Tehran.)

MEXICO.—It is reported that an American company has acquired the old "El Queso" mine in Pinal de Amoles district in Queretaro. This is a lead-silver-antimony mine and has been idle for some time.

MANGANESE

IRAN.—The first exploitation of manganese in Iran began in 1939 at the Government-owned Robat Karim Manganese Mines, 6 miles northwest of Shahryar. The mines were opened to supply manganese for the projected steel works at Karaj. Mining ceased after 2 years. Some hundreds of tons of ore were sold to the Allied Armies, and small quantities were taken by local glass and match factories. Between 3,000 and 5,000 metric tons of mined ore remain at the mines.

The deposit consists of steeply inclined lenticular veins of manganese dioxide and calcite which can be traced in a range of low hills of lava. Reserves are estimated at 60,000 tons of metal, with the possibility that other veins may be discovered in the area.

(Third Secretary of Embassy, John B. Crume, Tehran.)

MALAYA.—The economic deposits of manganese known in Malaya are in the States of Kelantan and Trengganu. These deposits were mined by Japanese companies and the product shipped to Japan.

(Annual report on the Administration of the Mines Department and on the Mining Industry of the Malayan Union for 1946.)

MONAZITE AND ZIRCON

MALAYA.—During the Japanese occupation 1,168 long tons of concentrates containing monazite and zircon were produced as a byproduct of alluvial tin mining. Of the concentrates produced, 220 tons were monazite, 741 zircon, and 207 mixed monazite and zircon.

(Annual Report on the Administration of the Mines Department and on the Mining Industry of the Malayan Union for 1946.)

NICKEL

INDONESIA.—The East Indonesian Minister of Finance disclosed that an organization is to be formed to exploit nickel deposits in southeast Celebes.

SILVER

MEXICO.—Cia. de Real del Monte y Pachuca, the largest silver producer in the world, is reported to have been sold to the Mexican Government on September 9, 1947, through the Nacional Financiera. The company will continue in its present corporate form and will be administered by Nacional Financiera.

TANTALITE AND COLUMBITE

MALAYA.—A small tantalite-columbite mine was operated near Kampong Bakri Muar, Johore, by open-cut methods during the Japanese occupation. Only 3 long tons of high-grade ore were produced during the period. The Japanese estimated that the deposit contained approximately 50 tons of concentrate averaging 12 percent Ta_2O_5 and 25 percent Cb_2O_5. Operation of a small deposit in Kedah resulted in the production of 2 tons of ore; bringing the total output to 5 tons.

(Annual Report on the Administration of the Mines and on the Mining Industry of the Malayan Union for 1946.)

TITANIUM

MALAYA.—The first large shipment of ilmenite, a byproduct of tin mining, from Malaya was in 1935.

Although no shipments of ilmenite were made in 1946,export permits were granted and shipments were expected to begin early in 1947.

(Annual Report on the Adminstration of the Mines Department and on the Mining Industry of the Malayan Union for 1946.)

TUNGSTEN

MALAYA.—Wolframite is mined chiefly in the States of Kedah and Trengganu. Production from other States has been insignificant. Virtually all of the output has been exported.

The only known deposit of scheelite is in the State of Perak; but, so far as is known, this deposit is now exhausted.

II. INDUSTRIAL MINERALS

GRAPHITE

MALAYA.—According to the Annual Report on the Administration of the Mines Department and on the Mining Industry of the Malayan Union for 1946, graphitic schist is of common occurrence in the Bidor area, State of Perak. A small quantity of the mineral was produced from small-scale mining operations in this area and is known to have been used

only for the manufacture of pencils. The operation altogether proved uneconomical.

Mining for graphite was carried on also in Kemaman, State of Trengganu, where some 650 tons of 40-percent material was produced. Although the existence of this deposit was known in prewar years, it did not attract the serious attention of any mining interests.

SALT

FRENCH MOROCCO.—A large deposit of salt has been uncovered near Guercif, and its development is progressing. It is hoped that before the end of 1947 the mine will be producing 1,500 tons a month, which will go a long way toward making French Morocco self-sufficient in salt. The deposit is being worked by the newly formed Societe Cherifienne des Sels. The head office is at Rabat. The company is capitalized at 12 million francs, the State holding 33 percent of the stock and the remainder being privately held.
(Consular Officer Carroll F. Connover, Casablanca.)

SULFUR

IRAN.—Sulfur mines are at Semnan, Demghan, in Azerbaijan and Bostaneh near Bandar Lengeh at the Persian Gulf. The mine that the Government has chosen for its own needs is at Delagian, 40 kilometers south of Semnan. It is in a vast plain, in Central Kayir, and the ore contains about 20 percent sulfur (which by distillation in closed clay retorts yields about 13 percent of its sulfur content). Preliminary studies indicate that the sulfur-bearing zone is confined to a width of only 50 meters but with an extensive length of at least 300 meters. The mineralized zone is covered by an overburden of several meters of sand and sterile rocks. The rock bearing the sulfur is a siliceous stone, including cracks and fractures in which the sulfur appears to have been deposited by sulfurous gases rising from below.

In recent years production has been about 700 metric tons of pure sulfur annually. However, it is believed that, under scientific operation, production might be increased to 2,000 or 3,000 tons. At present the mined sulfur is melted and purified in brick furnaces, thereby spoiling a great deal of pure sulfur. In the Iranian year 1319 (March 1940-March 1941) the cost of finished sulfur was 900 rials per ton. Exploitation costs have risen tremendously so that the mine, before it ceased operation, was selling pure sulfur at rls. 8,000 per ton.

No exact estimate of the sulfur reserves can be made, as neither the extension or thickness of the mineralized zone has been determined definitely. It is almost certain that 60,000 tons of pure sulfur remain in the zone and perhaps much more.

The mine is not working now, but it has never worked for a long continuous period. As demand for sulfur occurred the mine started up, and when the needed quantity of sulfur was extracted the mine was closed again. The exploitation and recovery methods at the Delazian mine are extremely primitive.

A second Government sulfur mine of potentially greater importance than the Bostaneh mine (Lat. 26° 36'; Long.54° 46') on the southern coast of Iran. The present mining methods are primitive and wasteful. Crude sulfur is piled loosely in cemented kilns and the top pieces ignited. The melted sulfur, 98 percent pure, oozes out of a hole in the bottom of the kilns and is collected in 4-gallon gasoline tins. From 5 to 10 tons a month are melted and the product exported to India.

Present production is small and irregular. However, it is estimated that 2½ million cubic meters of high-grade crude sulfur are available underground. Some mining engineers believe that if exploitation were put on a scientific basis the Bostaneh deposits could produce sulfur for export in great quantity.

The most productive sulfur mine at the moment is in a hilly district called Kuhi-Googuerd at the edge of the Kavir desert about 100 kilometers west of the Delazian sulfur deposits. This mine is leased by a private company.
(Third Secretary John B. Crume, Tehran.)

III. MISCELLANEOUS INFORMATION

ALGERIA

GENERAL, 1st half 1947.—Mineral production continued more or less normally during the first half of 1947, but drastic curtailments were imminent if steps were not soon taken to counteract rising costs and to place the Algerian producer in a more favorable position to compete in the world markets. Before the war Algeria's mineral industry was based on low-cost labor. As the 30-percent general wage increase in 1946 was not enough to compensate for higher living costs, it was only a matter of time until employers would be forced to grant another increase. As a matter of fact, the increase in minimum wages, effective March 1, occasioned no little rise in mining costs. Added to increased wages, a 30-percent total increase in freight rates in less than 6 months was rapidly bringing about a critical situation in the industry. Government relief of some kind was believed to be the only apparent means of keeping many of the mines operating.

Various concessions were made to local importers and exporters during the first 6 months of 1947. Private trade with Canada, which had lapsed during the war, was again authorized as of January 1, 1947, but iron and steel products, wood, nitrogenous fertilizers, cereals, milk products, and linseed oil remained the monopoly of French purchasing missions, rather than individual firms.

(Vice Consul Howard Brandon, Algeria.)

IRAN

GENERAL.—*Mineral Trade Notes* for October 1945 gave an abstract of studies made by the Middle East Supply Centre (American and British) Industrial Production Section, which included a few paragraphs regarding Iran (Persia). Additional study and investigation corroborate the general situation, which has changed little since 1945, but supply additional details and descriptions which are given in the following report prepared by Third Secretary John B. Crume, Tehran. For the most part, the minerals of Iran have never been exploited nor has the country ever been surveyed scientifically for possible mineral resources.

Mining is neither a major industry in Iran nor an important source of the country's income. Probably less than 10,000 workers are employed in the mines; and no minerals, with the exception of red oxide, a little sulfur, and rock salt have been exploited for exportation. A British army engineer's report on mining in Iran, published in 1944, calculated that metallic copper was being produced at 14 times the world price, antimony at 17 times, and metallic lead at 91/2 times.

No thorough geological surveys have been made of Iran, and none are in progress at present. The lack of information regarding the geology of the country is a factor that must be borne clearly in mind in any consideration of mining in Iran. No one knows the extent of the mineral wealth, and no one can say with assurance whether or not rich deposits exist. Iran is known to have coal, iron, copper, lead, antimony, chromium, nickel, manganese, arsenic, and sulfur, but no discoveries have been made as yet of any remarkably abundant deposits of these minerals. Production is meager and, excepting coal and sulfur, insufficient to meet the country's needs.

Mining methods used are generally primitive, wasteful, and devoid of science. The Government operates most of the country's important mines, and little progress has been made in mining development. Production is hampered not only by the lack of geological information, mining machinery, and scientific management but also by political factors and extremely poor and expensive transportation facilities. Another deterrent to the development of Iran's mineral resources is the absence of heavy industries in Iran. Moreover, the shortage of water in many regions of Iran renders large-scale mining impractical.

The Government appears unwilling to invest the many millions of dollars necessary to explore, equip, and exploit the mines when Iran's industrial needs are small. Private Iranian capitalists are even less willing to invest in the mines under such conditions. Private companies which

have concessions have not thus far earned large profits, and not many Iranian companies seem interested in entering this risky field of business. Many persons familiar with the mining situation in Iran believe that the best hope of quick development lies in interesting foreign mining corporations with large capital and wide experience to apply for exploitation contracts. They argue that only such a large corporation and there are none in Iran—could afford to gamble the large sums needed for thorough geological explorations and consequent exploitation. They believe that money spent in searching for minerals in Iran is a good commercial risk, but it remains essentially a risk. Before World War II, a foreign corporation applied for a concession intending to invest $2,000,000 in explorations. Because of certain political considerations the concession was not granted. As far as is known, there are no foreign applications for mineral concessions now under consideration.

In Part II of this issue, asbestos and sulfur in Iran are discussed. Other minerals, such as salt, gypsum, quartz, fullers' earth, mica, and borax, are found in most parts of Iran, but none are mined for export except the salt mined at Ghishm Island in the Persian Gulf. These mines are in remarkable deposits and might be developed for export on a large scale.
(Third Secretary John B. Crume, Tehran.)

KOREA (CHOSEN)

IMPORTS AND EXPORTS.—In announcing the new approved list of export and import items effective September 1, 1947, the director of the Department of Commerce pointed out that Korean industry has been rehabilitated to the extent that it can now import raw materials rather than finished products.

The import list includes tin and aluminum, sheet metal, and salt (purchase and distribution controlled by Monopoly Bureau.)

The export list includes asbestos, cobalt, beryllium, fluorite, graphite, kaolin, manganese, molybdenum, monazite, pyrophyllite, silica sand, and zinc ore. Tungsten concentrates have been removed from the list and will be handled by the government.
(Consul General William R. Langdon, Seoul.)

TUNISIA

GENERAL.—General economic conditions showed steady and marked improvement throughout 1946. The overall picture was much brighter than in 1945 and in some respects compared favorably with conditions in 1938, the last normal year of activity in Tunisia before the war. Although some reconstruction has been accomplished there is much to be done, however; such as ports, housing, and destroyed construction and agricultural implements.

Tunisia was a major battleground of World War II and consequently suffered serious property damage and economic dislocations during the 6-month period of actual fighting. Comparing 1938 and 1944-45, phosphate rock and lead production declined about 75 percent and iron output 90 percent.

Serious damage was done to nearly all Tunisian electric power plants during the war. However, except for 1943, when production dropped 50 percent, output remained roughly at prewar levels, owing to more efficient exploitation of remaining equipment. Electrical output still falls short of meeting the current needs and as a result prevents any large-scale industrialization of the country.

Little industry existed before the war. The most important industry was the manufacture of hyperphosphate and natural phosphate, pulverized, for use in fertilizers. Production was adversely affected by the war activities.

The mining industries are slowly approaching prewar levels. Phosphates, iron, lead, and zinc are the principal minerals mined in Tunisia. In general mine production is up to 61 percent of prewar average. About 73 percent of the output of all minerals in Tunisia is exported. In 1946, 43 percent of the value of Tunisian foreign trade was derived from mineral products.
(Vice Consul Thomas T. Turner, Tunis.)

THE ROCK CANDY MOUNTAINEERS TAKE ANOTHER CRACK AT IT

By CLARA BRAITMAN
Brooklyn Pick and Hammer Club

1947 was ushered out by two climactic events: the record-breaking 25.8-inch snowfall of December 26th, and the annual dinner of the Brooklyn Pick and Hammer Club on December 28th. A slight revision of Herodotus' famous motto was necessitated; "snow and gloom of night" and the N. Y. C. Transportation System had postponed the gathering until this date. But when we finally did meet at the Hotel Granada, (Brooklyn, N. Y.) that cold, bright Sunday afternoon, a goodly company was there. And, it goes without saying, a goodly time was had by all.

Our guests of honor were, naturally, Mr. J. C. Boyle, our guide, philosopher, and friend, with Mrs. Boyle and daughter, Marie. Marie came up from Bryn Mawr, Penna., where she is teaching Biology in a private high school.

The others present were: May Risch, who is working toward her M.A. at Alabama Polytech., investigating crystal structures of the sugars; Elliot Juni, now doing research work in biophysics at Washington U. at St. Louis; Leo Satz, at Schenectady, working on high-temperature alloys for G. E.,; Margaret Cacioppo, a freshman at Adelphi College, who plans to "go west" in her second year; Morris Grossman, mathematician; Steve Luchter, just graduated from Brooklyn Technical High School; Irving Horowitz, who is teaching general science in a Brooklyn parochial school; Mrs. Doris Steriss, a visitor from California, interested in minerals; Danny Luchter, a student at Colorado A. and M.; Martin Plotkin, an electrical engineer at Brookhaven; Bill Cohen, who is studying Geology at Columbia; Clara Braitman, research librarian in an optical company in N. Y.; Saul Shein, electrical engineer; Lillian D. Krugman, who gave as her occupation, "mother," but who is still interested in other little things besides children; Ira M. Friedland, engaged in the field of plastics and in post-graduate study in Biology; Carmine (Joe) Venuto, a graduate of C.C.N.Y.; Joe Kantor, studying chemical engineering at Penn. State; Ed Sunshine, transferred from chemical engineering to accounting; Harald Fitton, a high school student at Oxford, Ohio; Edward Cohen, a high school student at Brooklyn; and Alex Nicholson, Jr., studying Geology at Brooklyn College.

Here amid the snowdrifts the corn grew green, and the winter wit was harvested thick and fast. In spite of the hot air the room still was cold, causing some of the members to don their coats—wot fur, we will never know. Danny Luchter m. c.'d the program. There was a musical prelude of songs by Irving Horowitz, and selections by clarinetist Steve Luchter. Mr. Boyle was then presented with a twenty-five dollar U. S. Savings Bond. After greeting us, he contributed the following: "Christmas might be nice 365 days a year, and I'm told the folks on Fulton Street do just that. They initiate their newcomer friends by explaining, 'Now we have no-el'."

Much of the discussion and patter concerned the many absent members. Although they are not named here individually, because the scribe was unable to keep pace with the list, you may be sure they were missed.

While the dinner was in progress, we noticed that the pats of butter were stamped "Merry Xmas." Alex Nicholson observed that, with the price of butter, they were the most expensive Christmas cards he had ever seen. Everyone thought he rated an extra pat for that.

To record this memorable occasion permanently, Ed Sunshine took pictures. He spent some time waiting for his volatile audience to calm down. Someone commented: "He's waiting for a pin to drop." "Sure," replied Alex, " a rolling pin." This brought the dinner to a photo-finish; now everyone's waiting to see what will develop.

Amid the reaping of the corn, however, enough time was found for some business (other than monkey), the main point of which was the decision to reactivate the Brooklyn Pick and Hammer Club on a regular basis. While many different branches of science are represented in the activities of the membership, it all began with the kneepants brigade which did its first rock breaking at Mr. Boyle's mineral lab. In spite of the lode of work in other fields which most of us carry, we all desire to devote some portion of our spare time to crystallizing strata-gy.

Editor's Note: The Pick and Hammer Club consists of young men and women who, while boys and girls had studied minerals at the Children's Museum, Brooklyn, N. Y. These were the days, before the war, when the Mineral Lab. at the Children's Museum was made famous by Jack Boyle, the instructor, guide and friend of his many students. Though Mr. Boyle is no longer connected with the Museum, his many years work at the institution will never fade from the memory of his former students, all of whom are now his good friends. See "Rock Candy Mountaineers ride again", by Carmine J. Venuto, *Rocks and Minerals*, March, 1947, p. 215.

L. H. McMURRAY FEATURED

One of the largest and finest mineral collections in South Carolina is the one belonging to L. H. McMurray, of Rock Hill. The collection numbers over 3,000 specimens which come from many states and foreign countries.

In the Wed., Dec. 31, 1947, issue of *The Evening Herald*, of Rock Hill, S. C., Mr. McMurray and his collection were given a nice write-up. According to this front page featured story, Mac (Mr. McMurray) became interested in minerals while still a young boy. He bought the first few specimens of his collection to hold his interest and since then, by visits to localities and trading—now and then, of course, buying additional choice specimens—he has built up one of the largest and finest mineral collections in his state.

One of his favorite specimens is a quartz geode from Keokuk, Iowa, containing two calcite crystals. Another prized specimen is a gold ore from a mine in Nevada which was given him by Dr. W. E. Simpson, of Rock Hill. Dr. Simpson told him that that mine furnished gold for the North during the Civil War.

Mr. McMurray is an active collector who has visited many localities in his state, those adjoining, and others. Some of his finds have been sent to the Editor of *Rocks and Minerals* who pronounced them of excellent quality. It is hoped that Mr. McMurray, who is an enthusiastic member of the R & M A, will write up some of his trips for *Rocks and Minerals*.

The collection is housed in Mac's Radio Hospital, 321 Flint St., Rock Hill. Visiting collectors are cordially invited to call on Mac and inspect his fine collection and perhaps you might make some exchanges, too.

In the same city resides Horace W. Slocum, another noted collector. Mr. Slocum, a personal friend of the Editor of *Rocks and Minerals*, has written a number of articles for the magazine, and we hope he will induce his pal, Mac, to write a few.

The Texas Convention

(Continued from page 194)

vities call for. As for us, we would like to attend very much but we have more or less committed ourselves to go to the Carolinas. We plan to spend a few days in western North Carolina and then, sliding down into South Carolina to call on Horace W. Slocum and L. M. McMurray, at Rock Hill, and with them do some collecting in the Palmetto State. This trip might be called off and April 17th may find us in Austin mingling with the rockhounds of the Lone Star State.

P. S.—Just as we were going to press, we decided to go to Austin afterall and have written ahead for a reservation at Hotel Driskill. We will, no doubt, fly down from New York City, arriving in Austin on April 15th. On the way back we hope to make stops at Shreveport, La., Vicksburg and Jackson, Miss.; Birmingham, Ala., and Rock Hill, S. C.

CLUB AND SOCIETY NOTES

ATTENTION SECRETARIES—If you want your reports to appear in the May issue, they must reach us by April 12th—the Editor.

Pacific Mineral Society
(Los Angeles, Calif.)

The Society started 1948 out with the installation of the following officers: James Underwood as President, Harold Eales as Vice-President, Leon Heghinian as 2nd Vice-President, Virginia Everard as Secretary, John A. Jones as Field Trip Chairman, W. A. Clarke and George Kardell on Board of Directors.

Guest Speaker of the evening was Mr. Van Wagenen, who served with the Foreign Economic Administration or F. E. A. during the war. Their chief purpose was to stimulate the output of vitally important materials such as agricultural products, oils, minerals etc. Being a Consulting Mining Engineer, he was sent to Australia in 1943 and his first mineral to check was a scheelite deposit on King Island, to advise them on more modern machinery and the transportation controls, to step up production and shipping. His next mine to visit was the large zinc mine at Broken Hill, and from there, he traveled by train from Port Pirie by way of Kalgoorlie to the coast, where he was sent by boat to Port Hedland to check on a tantalite deposit. This trip proved to be both interesting and exciting as one section of the Australian Railroad was 330 miles long without a single curve, and the boat ride was close to the shore all the way, to avoid Japanese submarines and planes. He was then sent to a tungsten deposit at Alice Springs and to Darwin, where they were protected from Jap attacks by British planes. While in Australia, he checked on deposits of copper, bauxite, asbestos, uranium, corundum, graphite and many others as well as being exposed to "The Never, Never Country" in a charcoal burning automobile.

Upon arriving in the United States, the F.E.A. asked him to go to Africa. He visited a gold mine at Johannesburg which was mining one million ounces of gold every month. Their vein went down to a vertical depth of 9,000 feet. They had the deepest single lift of any mine, which was 6,900 feet. He then visited the Kimberley Diamond Mines in the interest of commercial diamonds. His chief job in Africa, was to visit Namaqualand pertaining to some rhombohedral calcite to be used as gun sites especially for the bazookas. His job also took him to Accra, Island of Ascension, and up the Nile River to Khartoum.

Mrs. A. E. Allard, Pub. Chmn.

New York Mineralogical Club

Columbia University (Schermerhorn Building, New York, City, Wednesday, Jan. 21, 1948.

The meeting was called to order at 8:00 P. M.

Alvin Filer Jr., Robert F. Ritchie, Joe Rothstein, Martin Walter, George R. Werner and Helen Yedlin were elected to membership.

It was proposed that a joint mineral exhibit of the New York Mineralogical Club and the New Jersey Mineral Society be held. A motion was made and passed authorizing the president to appoint a committee to determine the time and place of the exhibit.

The speaker of the evening was Dr. W. T. Pecora, who spoke on "Pegmatites in Minas Geraes, Brazil". During the war Dr. Pecora was engaged in war minerals work and was in Brazil for the purpose of increasing the production of the pegmatite minerals, mica, tantalite-columbite and beryl. The more important pegmatites lie in the province of Minas Geraes and are divided into three districts, both geographically and mineralogically. In the southern district the pegmatites are simple in their mineralogy. In the Conselheiro Pena the pegmatites are notable for their phosphate minerals; the new mineral, Brazilianite comes from this district. In the northern district the pegmatites are lithia bearing.

The pegmatites are mostly covered by soil which is deeply weathered and are located by float. Mining operations have been speeded up considerably by the introduction of bulldozers and scrapers to remove the soft overburden. Most of the pegmatites show zoning but the type of zoning varies. The most satisfactory procedure was to determine the type of zoning in a particular pegmatite and then plan the mining to get the minerals which were being sought.

The talk was very well illustrated with Kodachrome slides.

The meeting was adjourned at 10:20.

Purfield Kent, Secretary

Cincinnati Mineral Society

The first meeting of the new year was held at 8 P. M., Jan. 28, 1948, at the Cincinnati Museum of Natural History, Cincinnati, Ohio. Mr. Edgar Sarles, newly elected president, conducted the meeting.

Highlights of the meeting were:

1.—Standing vote of thanks to our artist-secretary, Miss Rose Ann Dehoney, for her fine work on the new membership card design.

2.—Adoption of a resolution to sponsor a display of local and associated minerals in the featured window of a downtown bank.

3.—Preview of next meeting on fluorescent minerals using the museum's recently acquired group of lamps (6 kinds of light to induce fluorescence). This meeting to be held at the museum on Feb. 24, 1948, at 8:00 P. M.

4.—An excellent talk on collecting minerals

in the Gaffney-King's Mt. Quadrangle in South Carolina by Mr. and Mrs. Warren Wells. This interesting couple own a farm in that region and personally collected on the farm and immediate vicinity 26 minerals. These minerals were discussed in some detail and specimens passed among members for personal observation.

The region discussed is characterized by igneous and sedimentary rocks and metamorphosed rocks of both groups. The discussion of panning for placer gold by Mr. and Mrs. Wells, and stories of local interest on silver mining operations in the region during Civil War days, combined with inspection of the mineral specimens, made this a very informative and interesting meeting. A list of the minerals collected and presented by Mr. and Mrs. Wells is as follows: Copper, galena, silver, placer gold, rutile, ilmenite, staurolite, kyanite, grunerite, sillimanite, siderite, corundum, asbestos (chrysotile), epidote, graphite, beryl, amethyst, garnet, pyrite, rock crystal, tourmaline, wad, hornblende, muscovite, pyrophyllite, and chalcopyrite.

Charles L. Gschwind

Pomona Valley Mineral Club
(Claremont, Calif.)

The Pomona Valley Mineral Club had as speaker at its February meeting, Mr. Hollis Page. He showed colored motion pictures of a recent trip through Oregon, Washington, and Montana. He told of the old mining towns he visited and of the mines.

After his interesting talk, the Club held its annual auction of minerals and cut and polished specimens, which were contributed by the members. Door prizes were won by Mrs. Kroger, Mrs. Kryder, and Mr. Smith.

On February 29, the Club is to go on a field trip to the Metropolitan Water District's Softening and Filtration Plant at La Verne. This trip is being arranged by Mr. Page.

G. W. Weist
Publicity Chairman

Mineralogical Society of Southern Nevada, Inc.

The Mineralogical Society of Southern Nevada, Inc., have elected their Board of Directors for 1948. The Board announced at the last business meeting that officers included: J. A. Wood, President; D. McMillan, Vice-President; D. G. Malcolm Treasurer; and Florence McMillan, Secretary. At that meeting Wood, President, appointed the standing committees as follows: Membership, A. T. Newell; Programs, M. G. Mastin; Property, D. G. Malcolm; Publicity, D. McMillan.

The officers and Committees will operate under the recently granted Articles of Incorporation, as a scientific group, with mineral collection and identification and research on related earth sciences as the object of study. It also intends to equip and maintain a Laboratory for identification tests, and promote interest in Mining in all its phases.

Under the auspices of the Society, Mr. Fred Anderson, Geologist, U. S. Geological Survey, presented an address on "Problems in Connection with Measuring the Flow of the Colorado River Above and Below Hoover Dam." On February 17th the Society sponsored another talk by Mr. Marvin Diamond, Office of River Control, Bureau of Reclamation, whose subject was, "Weather in Western U. S., and Its Effect on Topography."

The Society is currently giving assistance to several Southern Nevada Youth Groups, who are beginning preliminary Mineralogy, and also supporting related sciences by corresponding with Dr. Folke Linder, of Uppsala, Sweden, regarding the Branchiopods, which members of the Society found, after a heavy rain, in a local dry lake, last fall.

Visitors to this area recently were Mr. and Mrs. Fred Barnett of San Bernadino, members of the Orange Belt Mineral Society of California. The date for our annual show has just been set for Saturday March 6th. Other Nevada Societies have been invited to participate.

D. McMillan
Publicity Chairman
Boulder City, Nev.

The Georgia Mineral Society
(Atlanta, Georgia)
February, 1948, Meeting

Dr. R. A. Kirkpatrick, of the lecture staff, Union Pacific Railroad, spoke on "California" illustrating his lecture with colored slides. It was an interesting and informative talk and, the importance of irrigation to the economy of California and the nation as a whole was stressed. The desert was made to blossom and bring forth its fruit almost before our eyes.

The new section on Gemology was formally organized at a session of the executive committee and, the first meeting will be held on Monday, February 23rd. Members have been requested to bring along some specimens of their work for display at this meeting.

The Emerald (?) mentioned by this writer previously, has turned out to be a fine specimen of Aquamarine and, was found by Hoyte Peters, a high school boy, at New Hope school east of Monroe, Walton County, Georgia. The stone was badly chipped by young Peters who extracted it from a piece of quartz with his knife but, it has been put together and, it is now on exhibit in the State Capitol, Atlanta. Length of the crystal is 2 and 3-16 inches. The base of the crystal is ordinary green Beryl and the Aquamarine portion (naturally flawless) is 1 1-2 inches long, the crystal is 3-4 inches wide, uniform in width, and 1-2 inch thick.

The information on the aquamarine is taken from the news letter issued during January and originated by our President, Dr. A. S. Furcron, and, we hope that it will become a regular feature of the society.

S. C. Knox
Corresponding Secretary

From the News Letter, Georgia Mineral Society

Where to go and what to find in Georgia

Graves Mountain

Graves Mountain is situated about 11 miles from Washington, Ga., on the right side of the highway between Washington and Lincolnton. Turn to right off of highway at filling station (Graves Mountain in background) and turn off this road to a picnic ground at base of mountain. A large spring is between the mountain and picnic ground. Ascend the mountain along the path by the spring. Near the top of the mountain examine all rocks for Rutile, Pyrophyllite and iridescent Limonite. Move into the saddle and examine rocks again for the above minerals. On flank of the mountain to the right of your ascent, blue Kyanite and Lazulite can be found. The Lazulite crystals are embedded in a quartzite. Where the quartzite is sugary, good specimens of Lazulite can be freed from it. If the quartzite is hard, the Lazulite can be polished in the matrix.

(Note:) See *Rocks and Minerals*, May, 1939, pages 131-141, for article on the locality.

Magruder Mine—Near Washington, Ga.

Minerals—Pyrite, Chalcopyrite, Galena, Sphalerite, Covellite, Gold, Gahnite, Garnet, Azurite, Malachite, Bornite (?) Tenorite and Barite can be collected here.

This mine is a short distance from Graves Mountain, thus the two localities can be visited on the same trip. Turn left off of Washington-Lincolnton highway just beyond the county line (going from Washington) and take first fork to the right; proceed past several farm buildings and take first road to left; go along this road for 2 1-2 miles to an oak grove on crest of hill, and turn right. Park car and walk next 200 yards. Be careful of open shafts and pits.

Stone Mountain

Only 18 miles from Atlanta, Stone Mountain furnishes the mineral collector with the following minerals; Hyalite, Zoisite, Thulite, Stilbite, Uranophane, and pegmatite minerals.

It is advisable to visit the working quarries only on Saturday afternoons and Sunday; as blasting makes it dangerous on week days, also better specimens may be found on weekends as a blast is usually set off before quitting time on Saturday thereby uncovering fresh material. The abandoned quarries may be visited at any time.

S. C. Knox

Michigan Mineralogical Society

At the Annual Dinner Meeting of the Society, held on Jan. 11, 1948, the following officers were elected.

President, Mrs. John Mihelcic; Vice-Pres., Dr. Willard Parsons; Secretary, Miss Anne Proctor; Treasurer, Mr. Jerry Wehlann.

It was our 13th Annual Dinner and we had the largest attendance of any previous year. Many members won table prizes which had been donated by Dr. A. N. Goddard and Dr. Leslie Bacon. The menu was a folder in the form of the Society's emblem.

The program consisted of vocal and violin selections by two of the Society's members and then a lecture with slides "A trek across the Northwest from Minnesota to British Columbia", by Mr. Walter Nickel of Cranbrook.

We have a very interesting educational program in progress. It began in September, 1947 and will continue as long as members wish to have it. It is a course in mineralogy given by Dr. Willard Parsons, one of our members, who is a professor at Wayne University, in Detroit, and members may have university credit if they meet requirements. Some of the class meetings are held at Cranbrook Institute of Science, near Detroit, so we have a grand opportunity to become familiar with many exceptional specimens that are there on exhibit.

Anne Proctor, Secretary
256 N. Gd. Blvd.,
Detroit 16, Mich

Mineralogical Society of Springfield, Vt.

Fifty specimens of garnets, the birthstone of January with 12 different named varieties, were displayed at the meeting of the Springfield Mineralogical Society, illustrating a talk given by Harold Chandler on "Garnet Lore" at the University vestry, Wednesday night, Jan. 21, 1948.

"The Garnet, meaning a grain or seed, was worn by the ancient Egyptians," said Mr. Chandler, "as a guard against fear." Made into amulets they were supposed to foster grace in the wearer, increase friendship and fidelity, bring riches and honor to the wearer and preserve health.

In addition to the red garnet familiarly known, yellow, white, violet, pink, rose red amber, cinnamon brown, a green and black varieties are found, the color being governed by varying degrees of minerals in the composition.

Large stones not suitable for gems are ground and used for abrasives. Garnets weighing 10 pounds and 6 inches in diameter were found in New York City excavations, with a commercial value of $3.50 per carat. As a ring jewel, garnets range from $15-$50 for an ordinary stone. They are also used for watch jewels.

Ferric iron, aluminum and chromium make up part of the garnet content. Locations include many parts of the North American continent, in addition to Brazil, India, Norway, Ural Mountains, Africa, Ceylon, and the European countries.

Mr. Chandler made a chart showing the mineral names of various garnets, with their origin, common name, chemical formula, colors and location of the varieties produced to illustrate his address.

Hugh McInnes was elected presiden succeeding Victor Johnson; Stanley Goding, vice

president; Harold Slade,secretary; Miss Helen Higgins, treasurer. Harold Chandler is director and instructor for another term.

The attention of the group was called to tentative plans for adult classes in lapidary work and jewelry making to be held Saturday afternoons at the High School under the direction of a resident of Norwich. It was announced that the High School lapidary hobby club will feature completed work and equipment at the High School bazaar on Feb. 7.

Refreshments of crackers, cheese, cake and soda were served.

Newark Mineralogical Society

The 254th meeting was held Sunday afternoon February 1, 1948, at the Newark Museum, Newark, N. J. Mr. Wesley Hayes presided.

The Secretary read the minutes of the previous meeting which were appoved. The Treasurer's report was read and approved.

As Crystallography was the subject for this meeting, several members brought in many beautiful specimens for display.

The Membership Committee reported one new member, Miss M. J. Pitts, who was elected into membership. One former member, Mr. Howard Moore, was re-instated into membership.

Mr. Hayes offered several very helpful suggestions on improving displays and various ways of enjoying mineral collections.

The business being concluded, Mr. Hayes introduced the speaker, Mr. Curt S. Segeler of Brooklyn, N. Y., and President of the Queens Mineral Society, who proceeded to talk on the "Elements of Crystallography".

Mr. Segeler very capably brought out many interesting points among which were:
1—Importance of Crystallography.
2—Types of Crystals.
3—Geometric Crystallography.

Developing these three phases into the identification, classification, geometric, chemical and physical structure.

The speaker gave a very informative talk, using the black board to illustrate his explanations.

Crystal axes, crystal systems were explained, and models of the various crystal structure were handed out for examination. Each one was encouraged to identify these various models and to locate the crystal axes.

The Weiss Symbols and the Miller Index was also explained by Mr. Segeler.

The speaker concluded his lecture with a question and answer period and offered some suggestions of interest to the Society in its work.

A rising vote of thanks was given the speaker for his scholarly talk to our members.

The President made the suggestion that the members bring in some specimens of New Jersey minerals to be sent to an out of state collector who was wounded in the service of his country.

There being no further business the meeting adjourned.

M. J. Weeks
Publicity

New Club Organized in New Mexico

We are pleased to infom you of the organization of a new club (for which a name has not yet been selected) of rockhounds and artifact hunters in south-central New Mexico. The Club was organized Jan. 23, 1948, at the residence of S. F. Sanders in Brazito, New Mexico, and comprises a group of persons—residents of Brazito and nearby Las Cruces who, as an unorganized group, have previously designated themselves as "The Brazito Gang". Regular meeting are to be held at the homes and|or business establishments of the various members on the second Friday of each month, and a schedule of field trips is to be set up in the early future. Membership is open to any residents of the Hatch, Las Cruces, Brazito, Mesquite, and Berino area.

Officers elected at the organization meeting are as follows: President, Mrs. S. F. Sanders; Vice-President, Edwin Archer; Treasurer, S. F. Sanders; Recording Secretary, Mrs. Louis Roberts; Corresponding Secretary, Don Alfredo.

The Club's "headquarters" is conveniently located with respect to several sources of material of interest to the seeker of rock and gem material, prehistoric artifacts, and ore specimens and unusual land formations, of interest to those fascinated by geology, abound in the vicinity. Although the members' previous activities have proved fruitful, the desirability of organization has for some time been apparent. Individual members are at present prepared to dispose of specimen material on a sale or exchange basis, and a plan for inter-club exchange is contemplated.

Correspondence and exchange of ideas is welcome. Address, Don Alfredo, Corresponding Secretary, Casa De Las Cruces, Las Cruces, New Mexico.

Queens Mineral Society
(Richmond Hill, N. Y.)

The Queens Mineral Society held its monthly meeting on February 5th. Despite the difficulty of travel induced by additional snow, the meeting was as usual, well attended. The additional effort put into attending the meeting under the circumstances, probably was the knowledge that one of the members of our society, Mr. Frank Lewis, was to be the evening's featured speaker. Mr. Lewis is an engaging speaker unusually well voiced in matters pertaining to the earth sciences.

Mr. Lewis' extensive experiences in the field of research in matters allied with the earth sciences is a well established fact. The knowledge that Mr. Lewis is to be the evening's speaker, assures the members of an instructive and interesting evening. Mr. Lewis chose Opal as his subject and he proceeded to enlighten us

on its various species. It was made clear that there was no water of crystallization, but that water of constitution was present in opal and further, that the period of time required to properly season opal was variable, 3 months to 6 years. Mr. Lewis pointed out that opal was rarely found below a depth of 300 feet and that material found near the surface is subject to cracking or fissures. It was further indicated that after the removal of the outer surface, or shell, approximately 3 months time is required to ascertain that no cracks or fissures have developed.

It is adherance to these details in curing, before the final polishing takes place, that is essential if the appearance of fissures or cracks is to be avoided in the finished gem. The period of time required to cure opal varies due to the variation of the amount of water of constitution. We were informed that opal immersed in water for 24 hours might pick up as much as 16 molecules of water! Mr. Lewis concluded his talk with a display of many trays of opal from his choice personal collection.

Specimens from Bohemia, Queensland, Lighting Ridge and New South Wales, Australia; Hidalgo and Queretaro Mexico; and beautiful black opal from a stringer vein in Virgin Valley, Nevada, were shown.

The members also viewed some prints of the Austrian Crown and a large fresh water opal. These prints were exhibited by Miss Christine Kunz.

William Stadler
Secretary

Akron Mineralogical Society

The Akron Mineralogical Society held its first meeting of the year at the home of Dr. and Mrs. Paul Acquarone.

Homer A. Wright gave a talk on his trip to Washington, Oregon, and other Western states. He showed colored pictures of some of the places he visited and also beautiful specimens he gathered on his trip.

Mrs. C. R. Violette, Pub. Agnt.
392 Reed Ave., Akron, Ohio

New Columbia Road

Albany, N. Y., Dec. 5—A 2.74-mile section of Columbia county Road 73 extending from Ancramdale southward to the Dutchess county line will be reconstructed with 18-foot bituminous treated gravel surface under a $79,308.75 contract awarded to the Torrington Construction and Landscaping Company of Torrington, N. Y., by Charles H. Sells, New York state superintendent of public works. The existing highway line will be followed generally but many curves will be eliminated and the safety and riding qualities of the route greatly improved by relocating the new highway to one side or the other of the present roadway. All necessary grading and drainage structures and facilities are included in the work.

Kingston, N. Y., Freeman,
Dec. 5, 1947

Ancramdale is a little hamlet in southern Columbia County of eastern New York. Here are the old Ancram lead mines, abandoned for many years, but from whose dumps interesting minerals are still uncovered.

We hope to print an article soon on this famous old mine which throughout the years has furnished many nice and interesting specimens.

The reconstruction of the above mentioned road will be watched with keen interest by local collectors and especially so as the mine property borders on it. Let us hope that not even one "rock" from the dumps, which are now very small, will be used as fill for the new road.

The Original King Soloman Mine

According to stories handed down by Arabs from generation to generation, the Umm Garayat gold mine, 14 miles from Wejh in Saudi Arabia, was originally worked by King David's miners. In the locality there were over 50 mines which have been traced. The largest is the Mahad Dahahab, or Cradle of Gold, which may have been one of King Soloman's mines. This mine is now worked by the Saudi Arabian Mining Syndicate, Ltd. The gold ore in the ancient tailings are found in sulphides of copper, lead, zinc and iron. Concentrates and precipitates are shipped to a smelter in New Jersey, USA.

Wejh is a little city in northwestern Saudi Arabia and on the Red Sea.